MULTIFUNCTION EQUIPMENT IN SMALL ESTABLISHMENTS

INPUT

ABOUT INPUT

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INPUT provides planning information, analysis, and recommendations to managers and executives in the information processing industries. Through market research, technology forecasting, and competitive analysis, INPUT supports client management in making informed decisions. Continuing services are provided to users and vendors of computers, communications, and office products and services.

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UNITED STATES, West Coast
2471 East Bayshore Blvd.
Suite 600
Palo Alto, California 94303
(415) 493-1600
Telex 171407

UNITED STATES, East Coast
Park 80 Plaza West-1
Saddle Brook, New Jersey 07662
(201) 368-9471

UNITED KINGDOM
INPUT Europe
Empire House
High Road

rvice Company, Ltd.
, No. 12-7 Kita Aoyama
Ku

7-9 Merriwa Street
don N.S.W. 2072

S
MFE
SES - MFE
AUTHOR
Multifunction Equipment
TITLE
in Small Establishments

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IMPACT REPORT #2

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MULTIFUNCTION EQUIPMENT

IN SMALL ESTABLISHMENTS

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1 INTRODUCTION

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I INTRODUCTION

- The merging of computer, communications, and graphics technologies and the development of microprocessors and LSI has given rise to the possibility of multifunctional equipment and services (MFE). The impetus to develop MFE is based on the assumption that relatively modest increases in the hardware required for a primary system will provide combinations of functional capability more economically than independent systems. Examples of MFE are as follows:

  - Business computers providing word and text processing capability.
  - Word processing systems providing data entry and accounting functions.
  - Computer networks providing electronic message service.
  - Communications networks providing information retrieval and processing services.
  - Integration of voice, data processing, and message services into a common digital network.
  - Electronic storage, retrieval, transmission, and duplication of both text and graphic information (as opposed to data or messages).

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- The possible combinations are almost unlimited and many are very exciting to both vendors and end users. However, some potential combinations (from a technical point of view) must be seen through the gauntlet of whatever ground rules result from the second Computer Inquiry currently being conducted by the FCC.

  - This report does not analyze regulatory issues. It only considers whether the user would want such a service, if available.

- Both the complexity and uncertainty have led to lack of clearly defined products and markets.

- INPUT selected small establishments for its initial research into MFE based on the following assumptions:

  - Small businessmen have data processing, word processing, communications, and information storage problems which are comparable to large establishments.

  - A single executive in a small company frequently has detailed knowledge (and decision making responsibility) for all areas of information processing which include: data processing, voice communications, office operations, paper handling costs, etc. In a large company this is often not the case.

  - Many small companies have not committed themselves to fully automated systems (data processing, communications, word processing) which might preclude or inhibit consideration of MFE.

  - The specific systems requirements of small establishments have not been adequately addressed in the past and are not currently (fully) understood by vendors.

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- The possibility of combining functions in order to obtain cost justification for MFE could be very attractive for small establishments.

- This study was performed by analyzing both potential users of multifunction equipment and services and potential vendors of multifunction equipment and services.

  - Manufacturers of electrical equipment, and insurance brokers were analyzed to obtain the viewpoints of different users:

    . Manufacturers of things to which paperwork is secondary.

    . Insurance brokers which have paperwork as their prime output.

  - Vendors were analyzed to determine how significant is their interest in providing multifunction equipment and services.

- The report analyzes both points of view separately and then combines them into an overall conclusion.

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II EXECUTIVE SUMMARY

II EXECUTIVE SUMMARY

A. KEY CONCLUSIONS

- The market for multifunction equipment has already started to develop. It is being driven by vendors who wish to increase their revenues by performing additional functions for the user (such as a small business computer performing text processing) utilizing the vendor's traditional equipment/service base.

- In the viewpoint of the vendors, there are no technological barriers to multifunction equipment. However, when multifunction communications and computation services are considered, there are serious regulatory barriers.

- The user is ready (cautiously) to accept multifunction equipment/services. However, he does not fully understand all potential systems and thus will need education into the capabilities of copier based, text processor based, and PABX based systems.

- Sales of multifunction equipment and services will be more complex than the sale of single function equipment/services.

- The sales approach, equipment configuration, and applications programs must all be targeted to specific user industry sectors.

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B. LOGICAL MULTIFUNCTION EQUIPMENT AND SERVICES

- It is expected that vendors will enter the multifunction market by expanding their present offerings, rather than by entry into an all new area. For example, it is more reasonable that a small business computer manufacturer would add text processing to the computer, and that a copier manufacturer would add computer output functions to the copier rather than the other way around. For this reason, the multifunction equipment and services investigated in this study were chosen and defined as follows (see greater detail in Chapter IV):

  - System #1 - A small business computer with the add-on function of text processing - a logical entry from companies such as IBM, NCR, and DEC.

  - System #2 - A shared logic, multi-station text processor with the add-on function of data processing - a logical entry from companies such as WANG, Burroughs/Redactron, and 3M.

  - System #3 - An office copier with add-on functions of facsimile and output computer printing - a logical entry from companies such as Xerox and Kodak.

  - System #4 - A PABX system with add-on functions of text processing and data processing - a logical entry from companies such as Northern Telecom and ITT.

  - System #5 - Addition of information processing to a communications service - a logical extension of service from value added carriers such as Telenet and Tymnet (if regulatory agencies allow).

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- System #6 - Addition of communications services to timesharing - logical offerings from companies such as GE (if regulatory agencies allow).

- During the field research of this study, users were asked which systems they would purchase, what features they want on such a system, and what they would pay for these systems.

C. ACCEPTANCE OF MULTIFUNCTION EQUIPMENT BY USERS

- In general, small establishments have not been approached by vendors to purchase multifunction equipment. As a result, the small establishments are not familiar with the concept. In addition, small establishments have not spent very much time thinking about the subject. However, when they were introduced to the idea of multifunction equipment, they immediately understood it and were able to comment upon how multifunction equipment would relate to their business needs. The acceptance of multifunction equipment depends upon the equipment offered, and upon the use to which this equipment can be put.

- The response of users to multifunction equipment is shown in Exhibit II-1 by equipment type. System #1, which is based upon a small business computer was very well accepted and almost all users would buy such a system. The other systems were accepted by a bit less than one half of the users.

  - The small business computer was strongly accepted because it was familiar to the users and because users attribute capabilities of assuming additional function to the computer.

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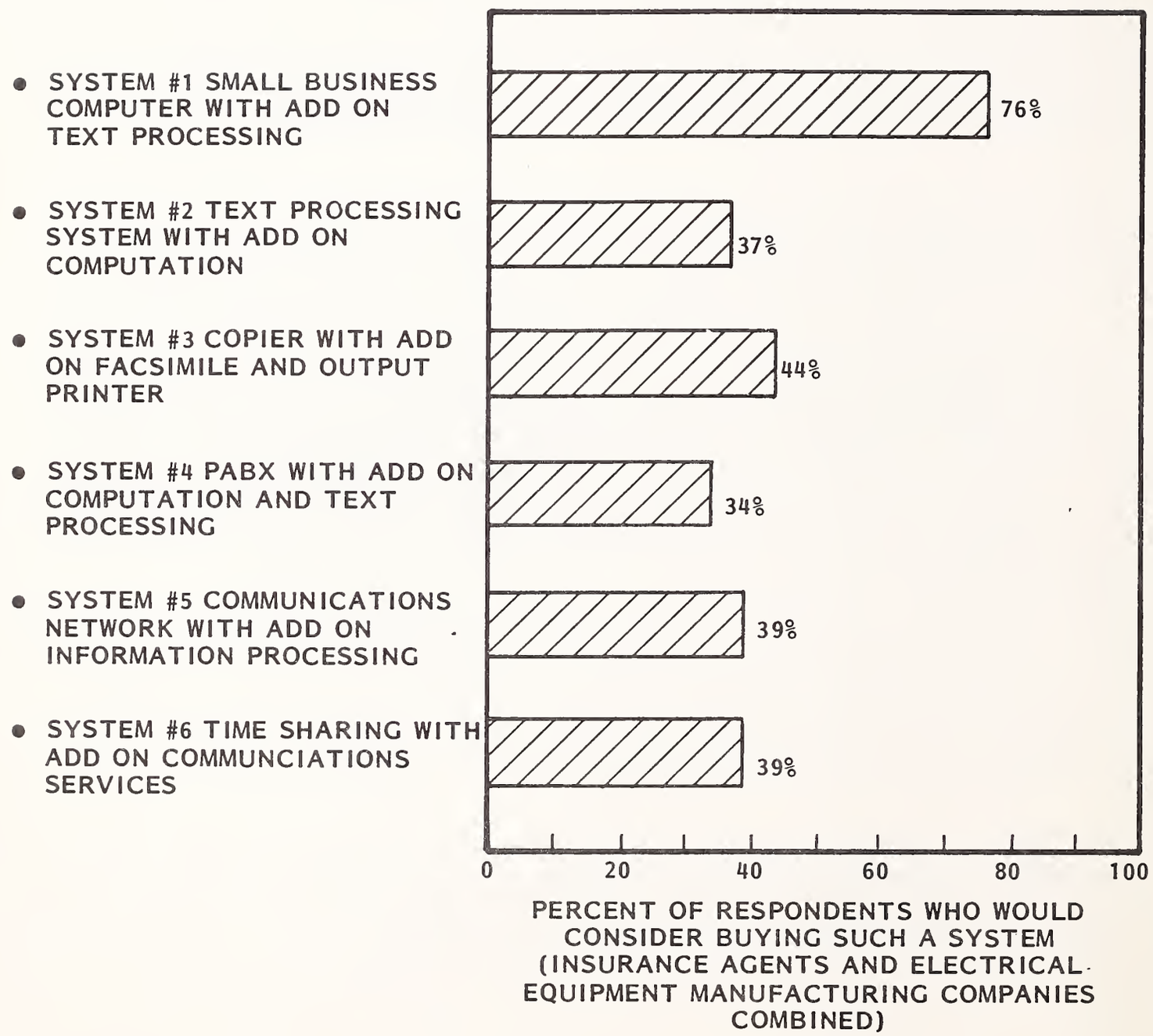
EXHIBIT II-1

ACCEPTANCE OF MULTIFUNCTION

EQUIPMENT AND SERVICES (BY SYSTEM)


• SYSTEM #1 SMALL BUSINESS COMPUTER WITH ADD ON TEXT PROCESSING
• SYSTEM #2 TEXT PROCESSING SYSTEM WITH ADD ON COMPUTATION
• SYSTEM #3 COPIER WITH ADD ON FACSIMILE AND OUTPUT PRINTER
• SYSTEM #4 PABX WITH ADD ON COMPUTATION AND TEXT PROCESSING
• SYSTEM #5 COMMUNICATIONS NETWORK WITH ADD ON INFORMATION PROCESSING
• SYSTEM #6 TIME SHARING WITH ADD ON COMMUNCIATIONS SERVICES
76%
37%
44%
34%
39%
39%
0
20
40
60
80
100
PERCENT OF RESPONDENTS WHO WOULD CONSIDER BUYING SUCH A SYSTEM (INSURANCE AGENTS AND ELECTRICAL EQUIPMENT MANUFACTURING COMPANIES COMBINED)

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- Systems based upon text editing systems and PABX systems were not as well accepted because users do not attribute information processing capabilities to text processing on PABX systems. However, users can be educated to the capability of these systems.

- The combined communications and information processing (service) systems were relatively well accepted. However, the regulatory issue was not addressed. If the FCC were to allow combined network and processing systems, the users would accept them.

- Users are quite reasonable in what they are willing to pay for multifunction equipment (Exhibit II-2).

  - Many users are willing to pay the equivalent of replaced costs (by combining two systems into one). Vendors should certainly be able to meet this goal.

  - Most users wanted a savings over previous approaches. However, the 20% savings stated is reasonable and attainable.

- User perceptions of multifunction equipment are briefly summarized in Exhibit II-3.

  - The advantages as summarized by users are lower cost and better performance. Vendors should emphasize these advantages in selling equipment.

  - The perceived disadvantages of multifunction equipment are that equipment failure could impair many operations of the small establishments, and the possible initial equipment cost. Both issues should be met head on.

    . The reliability issue can be met by equipment design and field maintenance organization.

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EXHIBIT II-2

WILLINGNESS OF RESPONDENTS TO PAY FOR MULTIFUNCTION EQUIPMENT

SYSTEM TYPES	PERCENT OF RESPONDENTS WILLING TO PAY AT LEAST AS MUCH AS REPLACED COST	COST SAVINGS WANTED AS PERCENT OF CURRENT COST
• SYSTEM #1 SMALL BUSINESS COMPUTER WITH ADD ON TEXT PROCESSING	21%	20%
• SYSTEM #2 TEXT PROCESSING SYSTEM WITH ADD ON COMPUTATION	63%	10%
• SYSTEM #3 COPIER WITH ADD ON FACSIMILE AND OUTPUT PRINTER	29%	20%
• SYSTEM #4 PABX WITH ADD ON COMPUTATION AND TEXT PROCESSING	29%	-

RESPONDENTS ARE INSURANCE AGENTS AND ELECTRONIC EQUIPMENT MANUFACTURERS

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EXHIBIT II-3

USER PERCEPTIONS OF MFE

- KEY ADVANTAGES AS PERCEIVED BY USERS
  - LOWER COST OVERALL
  - FEWER OPERATIONS REQUIRED TO PROCESS INFORMATION
  - BETTER RESPONSE FOR INFORMATION
- KEY DISADVANTAGES AS PERCEIVED BY USERS
  - POSSIBILITY OF EQUIPMENT FAILURE
  - INITIAL EXPENSE OF EQUIPMENT

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. The initial cost issue can be met by pricing plans.

D. VENDOR ATTITUDES

- The multifunction equipment market will be driven by vendors, and vendors show a strong interest in the area. Vendors interviewed believe that they must get into the field and move into other vendors' markets before the other vendors get into their markets. Vendors interviewed believe that:
  - Users will benefit from improved performance as well as cost savings.
  - Office and paper oriented businesses are prime candidates.
  - Marketing and support will be a problem.
- All vendors interviewed are now offering or planning to offer multifunction equipment.

E. RECOMMENDATIONS

- Prepare to enter the multifunction equipment and service market as soon as possible, but in no event later than two years from now.
- Insure that all equipment presently under design will be able to be retrofitted (preferably in the field) to a multifunction capability.
- Insure that sales literature and salesman training indicates that equipment purchased now can be expanded in capability in the future (provided the vendor intends to do so) and that a potential customer will not lose any flexibility by buying equipment now.

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- Become knowledgeable about all information processing requirements of the vendor's customer base including data and text information processing and communications.

- Have the sales force start to meet all user personnel responsible for the functional specialties of EDP, office, communications (for future sales).

- Keep the design and operation of multifunction equipment simple and insure that the user will understand that it is simple.

- Reliability and maintainability are of key importance, and they must be demonstrated to the user.

- Those companies which will offer EDP as an "Add On" function will have to offer industry specialized application packages (not only general accounting packages).

- Keep the initial cost of the equipment down by using modular design so that a user does not have to spend too much initially on the system.

- Prepare formal economic justification analysis for prospective users as a sales tool.

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III THE UNIQUE PROBLEMS AND OPPORTUNITIES OF SMALL ESTABLISHMENTS

III THE UNIQUE PROBLEMS AND OPPORTUNITIES OF SMALL ESTABLISHMENTS

A. INFORMATION CHARACTERISTICS

- Small establishments have the same data processing and communications problems as large establishments. However until recently, they have been placed at serious disadvantage in being able to apply computer technology to the solution of these problems. Examples are as follows:

  - Small establishments have requirements for the same accounting and control procedures as larger enterprises. As products and services (to say nothing of government reporting requirements) have become more complex, manual methods will no longer suffice yet in-house data processing still appears too expensive and complex for many organizations.

  - Word and text processing are becoming an increasing burden as personnel costs escalate and general skills levels decline. Small establishments are only now "trying new technology" to demonstrate increased productivity and quality.

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- Information and data storage in small establishments is often essentially paper oriented which makes ad hoc reporting requirements for management, customers, vendors, or government extremely difficult. This, in turn, causes increased data processing, word processing, and office copying problems.

- When communications responsiveness is essential, the telephone is used, but even voice communications are more expensive for small establishments since volumes may not warrant leased facilities (or systems to exercise cost control).

- When small establishments must go outside for computer services (either data processing or computational), the systems have not been designed for their specific needs and they do not have the technical resources to tailor the systems. This frequently results in the small establishment user paying more and being less satisfied with the services.

- While the small establishment user has not been able to apply advanced technology to his specific internal requirements, he is under increasing pressure to interface with large computer/communications systems (customer, vendor, government). Data entry requirements and reporting from these systems are not compatible and the small establishment is forced to seek technological solutions which it does not fully understand or consider cost effective.

- Fortunately, while the small establishment is faced with significant technological problems (many of which are beyond its control), it has several advantages:

  - There is better centralized understanding of the specific problems.

  - The organization is not encumbered with obsolete or unsuccessful technological solutions.

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- Internal political conflict is relatively straightforward and normally disposed of in an expeditious manner.

- There is centralization of decision making power.

- The above results in unusual flexibility in seeking problem solutions and ability to make rapid decisions if the "right" solution is available.

B. CURRENT INFORMATION SYSTEMS USAGE

- Exhibits III-1 through III-4 present graphically how the information requirements of the small establishments interviewed during this study are currently being met. This base of equipment and services usage should be compared to the attitudes of the respondents to MFE. Two general categories are presented:

  - Insurance agencies which are service oriented or office oriented.

  - Electrical equipment manufacturers which are product oriented.

  The service oriented enterprises interviewed were independent property and liability insurance agencies which had less than 100 employees. The electrical equipment manufacturers' enterprises interviewed normally had between 100-500 employees (although several companies interviewed had recently exceeded 500 employees through acquisition).

- Exhibit III-1 shows that:

  - Thirty-seven percent of the insurance agencies interviewed had small business computers (or minicomputers) installed, and 63% used outside service bureaus for at least part of their commercial data processing requirements. None relied solely upon manual operations.

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EXHIBIT III-1

CURRENT INFORMATION SYSTEMS USAGE -
DATA PROCESSING

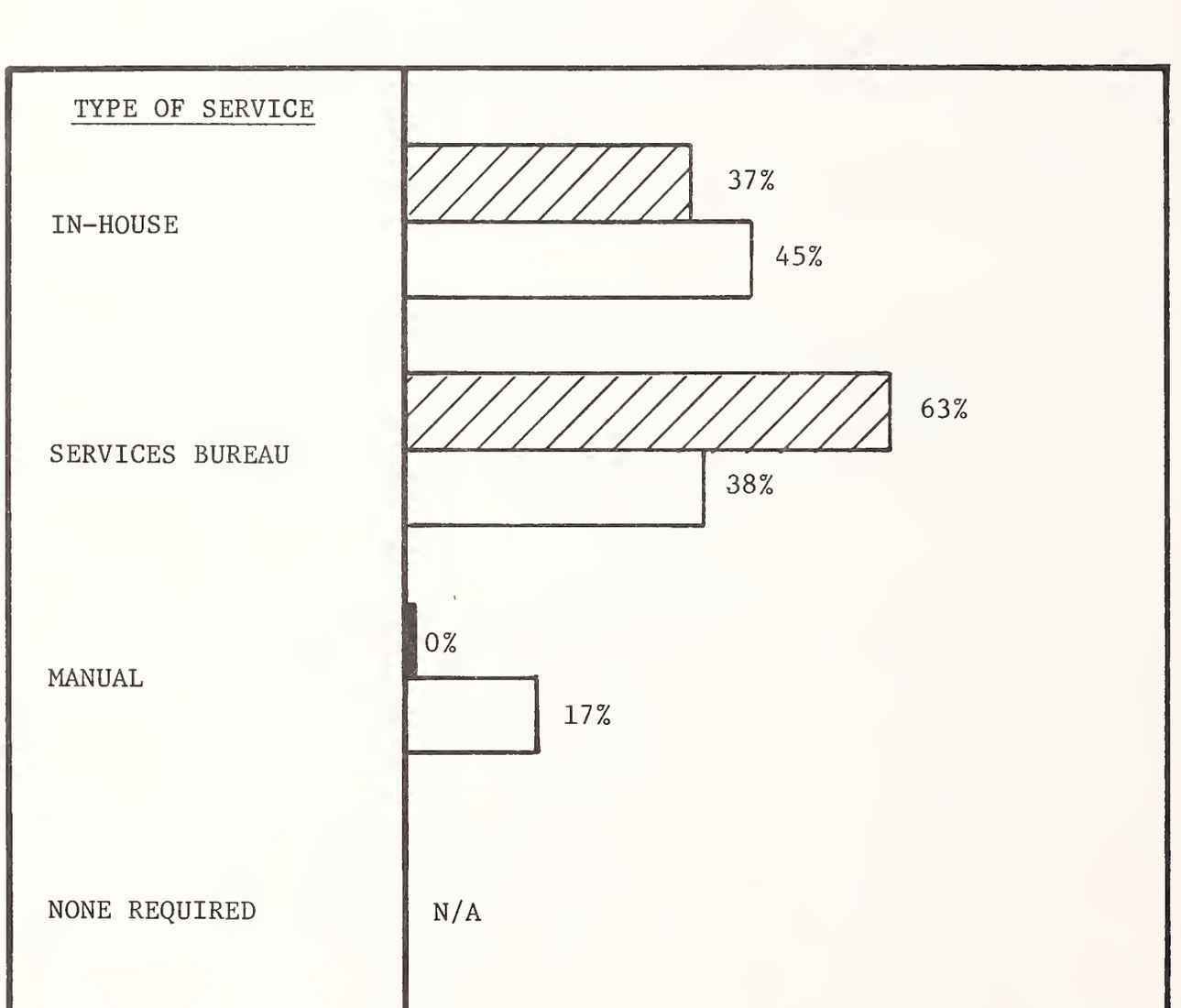

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EXHIBIT III-2

CURRENT INFORMATION SYSTEMS USAGE -
WORD PROCESSING

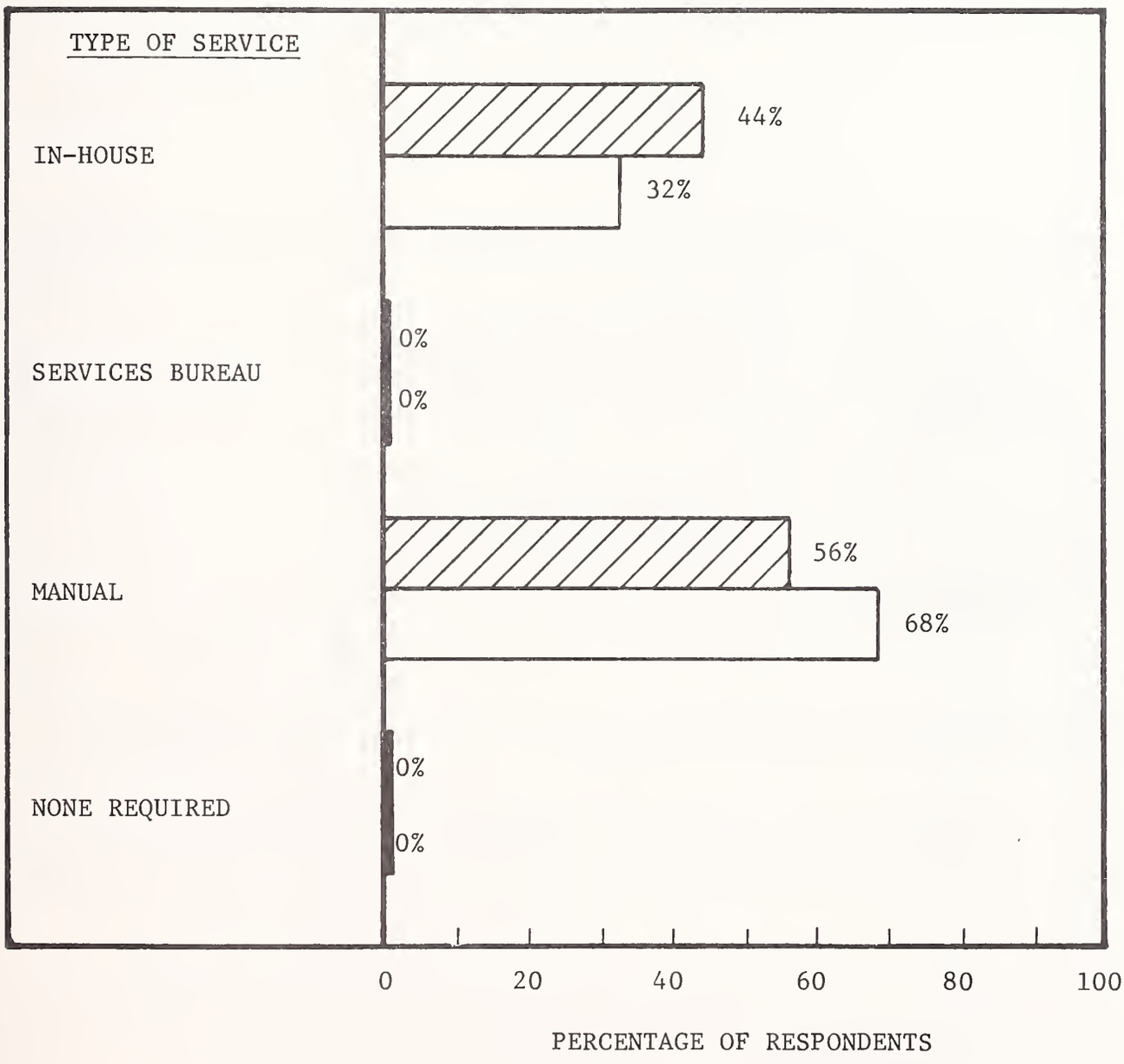

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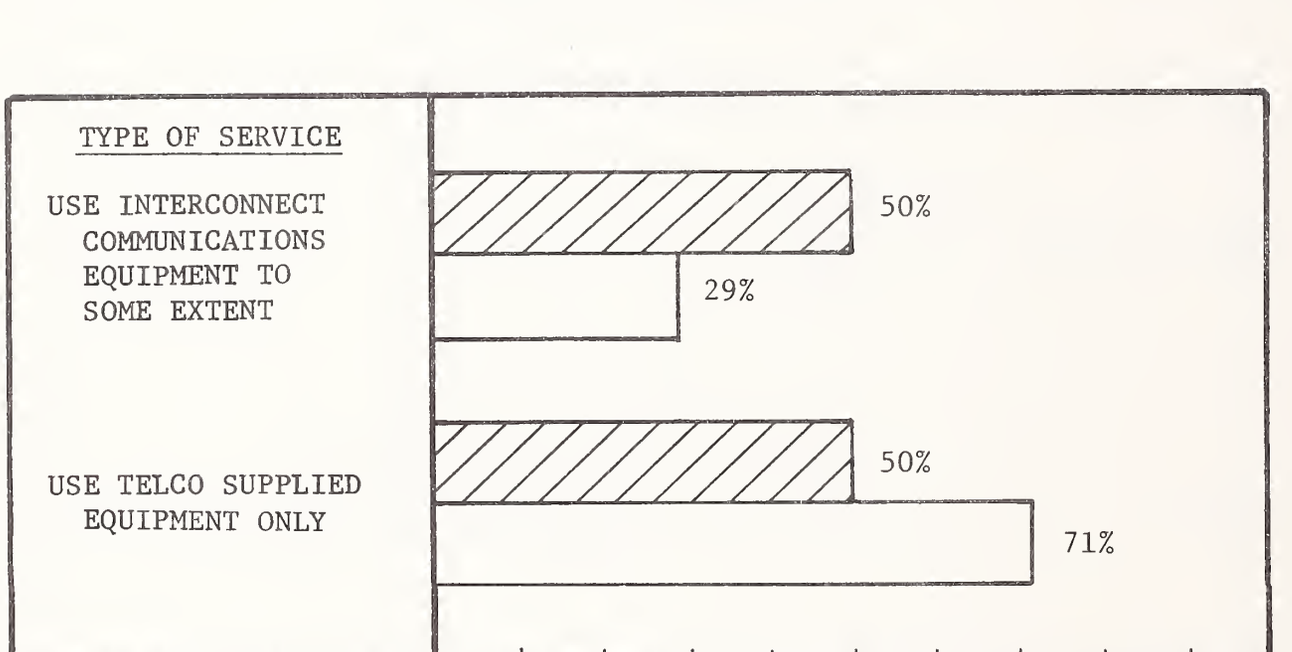
EXHIBIT III-3

CURRENT INTERCONNECT SYSTEMS USAGE -
VOICE COMMUNICATIONS



INSURANCE AGENCIES

ELECTRICAL EQUIPMENT MANUFACTURERS

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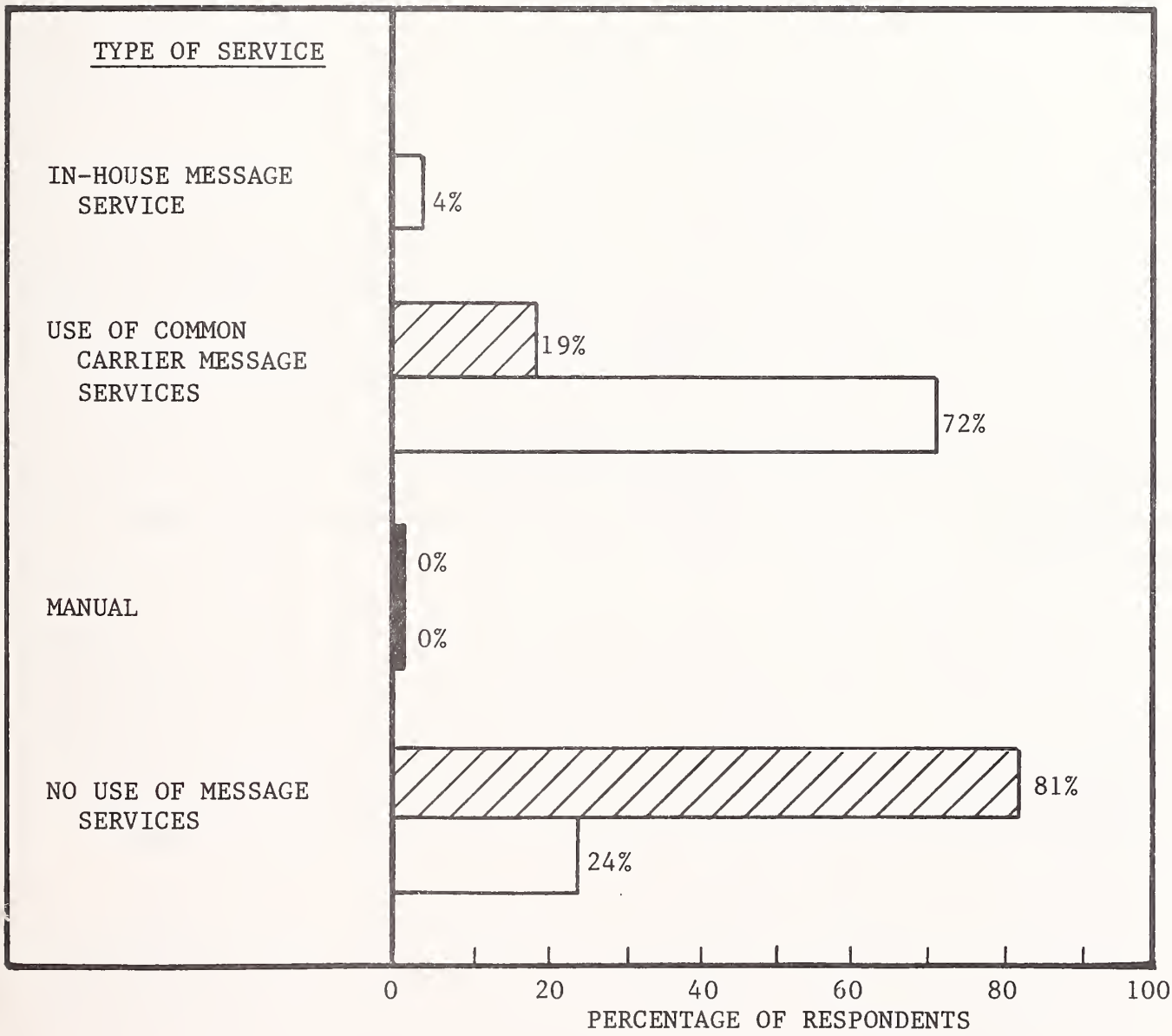
EXHIBIT III-4

CURRENT INFORMATION SYSTEMS USAGE -

COMMUNICATIONS MESSAGE SERVICES



INSURANCE AGENCIES

ELECTRICAL EQUIPMENT MANUFACTURERS

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- Forty-five percent of electrical equipment manufacturing enterprises had in-house computer equipment installed for data processing, and 38% relied primarily on service bureaus. Seventeen percent used manual systems exclusively. (Manual systems did not exclude the use of electro-mechanical bookkeeping equipment.)

- The manufacturing companies appear less inclined to contract out for data processing services, but do not appear to have significantly more in-house computer systems installed (even though they average more than ten times the number of employees). This is understandable since production workers do not generate as much "paper work" as office workers in service organizations.

- Exhibit III-2 shows that a higher percentage of insurance agencies than manufacturing companies have word processing equipment installed (44% vs. 32%). Despite the great disparity in size between the establishments this is not surprising, because of the paperwork orientation of the insurance business.

- On the other hand, every interviewee had at least one office copier installed. This does not necessarily indicate the market is saturated (or the users are satisfied).

- In the relatively few years since the "Carterfone" decision, increasing numbers of customers are opting for telephone equipment other than that supplied by the common carriers. Exhibit III-3 shows 50% of the insurance agencies and 29% of the manufacturing companies interviewed are selecting some of their telephone systems hardware from vendors other than the common carriers.

- Over 75% of the small manufacturing companies made at least some use of common carrier electronic message services and one interviewee had set up an intracompany message service using its computer network. Only 19% of the insurance agencies required (or could justify) this service. (See Exhibit III-4.)

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- The use of interactive computing for either scientific calculations or data base access among the companies interviewed was 12%-13%. Again note that the insurance agencies interviewed were considerably smaller than the manufacturing companies, although both had the same usage of interactive computing.

C. INFORMATION REQUIREMENTS

- The information requirements of small establishments (500 employees or less) are just as complex as those of Fortune 500/50 companies. However, because of their size the small establishment can not afford the sophisticated information processing staff of the very large company. In addition, the small establishment has "automated" only recently. Thus it does not have all of the application experience as a larger company. Because equipment and services vendors (and especially their sales forces) first approach the larger users (the greatest potential sale), the small establishments have less equipment and services designed specifically for their needs and less education from the vendor sales force. All of these developments tend to make the small establishment unique in its needs, and in how it should be marketed.

1. DATA PROCESSING

- Small establishments in all industry sectors are using computer equipment and services to a great extent. However, the use of industry specialized applications, such as materials control for a manufacturing company and policy accounting for an insurance company, are not used by all sizes of small establishments. Thus the small establishment has the unique problem of just starting to utilize industry specialized programs and applications. In addition:

  - Because sophisticated EDP managers are best rewarded by the large user the small establishment does not have the planning capability of the large company. Thus, the vendor of multifunction equipment must

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expect to help the small establishment learn about multifunction equipment and plan for its introduction.

- The small establishment has less equipment on-site than a large company does. Thus, on-site operating training and maintenance can be relatively expensive. Thus vendors selling computer equipment to the small establishment must try to geographically group their customers for efficient training and maintenance.

- Each small establishment may be run in a different and unique way from each other small establishment. However, the incentive for vendors to customize software and hardware for a small establishment is less than for a large company. Thus, vendors of computer equipment and services must find a compromise solution by which the small establishment can have some customizing performed, while expenses are minimized. This situation will continue with multifunction equipment because office and communications functions as well as the EDP applications will be performed differently at each company.

2. TEXT PROCESSING AND COPIER BASED SYSTEMS

- Text processing is just starting to be used by small establishments thus the unique requirements for text processing sales include "missionary work" by the vendor of the text processing equipment to show the small establishment management how to use text editing, and why to use it. In addition:

  - In the perception of the small establishment management the amount of money spent on copiers and facsimile may not be sufficient for the small establishment to consider the use of multifunction equipment. However, the management may not really understand what they have been spending and education by the vendor may be needed.

  - The small office staff may require people to do "double duty" in assignments. Thus fewer text editing specialists may exist in small

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establishments. For the MFE vendor this makes the introduction of this equipment harder.

3. PABX AND COMMUNICATIONS EQUIPMENT AND SERVICES

- The small establishment does not have a sophisticated communications manager. In addition, even the largest users find that the combination of data and communications and the optimization of voice networks is a very sophisticated topic. All of the problems which result from the introduction of data processing and text processing exist for the combined use of PABX and computer or word processing equipment and services. In addition:

  - Users do not perceive a PABX as an "intelligent processor."

  - Familiarity with leased line and interconnect tarrifs, and in equipment which chooses optimum routing and which also provided extension billing is limited. Thus, vendors selling MFE equipment based upon a PABX must do more user education than vendors of other MFE equipment.

D. ORGANIZATION OF SMALL ESTABLISHMENTS

- Small establishments, almost by definition, do not have the depth of staff of Fortune 500/50 companies. As a result, the process of deciding upon new information processing equipment and services is different from Fortune 500/50 companies. This results in both disadvantages and advantages for vendors of MFE.

  - In a large company there is often a head of information services, and reporting to him generally is a head of EDP, a head of communications, and often a head of office automation. Thus, there is an expert capable of understanding new equipment and service offerings of any

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type and a professional staff which can make a recommendation for new equipment.

However, in the small establishment there is no professional staff to make such evaluations of equipment and services. Evaluation will be made by non professional personnel. For the vendor of MFE equipment and services this means that his offerings must be very simple and easy to use, or they will not be accepted.

- On the other hand, the chief executive officer of the small establishment will be involved in the purchase decision, while the chief executive officer of the large company will not be involved. Thus, a small establishment can purchase MFE in a short period of time, if it is justified, while the large company may take longer because the decision must pass through more levels of approval.

E. EXPENDITURES OF SMALL ESTABLISHMENTS ON INFORMATION PROCESSING EQUIPMENT AND SERVICES

- Expenditures of small establishments for information processing equipment and services are quite variable in comparision to large companies since the small establishment does not have the large number of employees to "average over" which the large company has. In addition, it is hard to interview small establishments to determine their expenditures on information processing equipment and services because:

  - They do not have professional staff to monitor such expenditures, and as a result just do not know the expenditure level.

  - Personnel at small establishments are not as used to being interviewed as are EDP and communications managers of Fortune 500/50 companies, and often will not make the information available.

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- Thus, expenditures per employee of small establishments to use with this analysis were taken from the Small Establishment Annual Report 1978 for which the interview sample was 585 companies and also for which a vendor analysis was made to compare user interviews and vendor sales.

- These expenditures (to vendors only) were published as a ratio of expenses per company employee in 1977 as:

	DISCRETE MANUFACTURING COMPANIES	INSURANCE COMPANIES
COMPUTER EQUIPMENT/ SERVICES & SUPPLIES	$220	$217
OFFICE EQUIPMENT	$157	$191
COMMUNICATIONS EQUIPMENT/SERVICES	$409	$502

F. SECRETARIAL COSTS

- INPUT has completed a study on the quantity of documents prepared by secretarial employees. Availability of data was made possible through an INPUT staff member who is also a member of the National Secretaries Association.

  - Using a portion of the membership list of the National Secretaries Association, INPUT mailed out questionnaires to a small list of organization members. This report section is a summary of some key results obtained from 30 completed questionnaires.

- The research on secretarial work rates and wage rates was undertaken to obtain data by which to judge the benefits of multifunction data/text equipment. It provides information about how much money is spent on typing

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so that the value of equipment to increase the efficiency of typing can be derived.

- Although the sample is relatively small and wage rates and time spent typing is quite variable by sector and job assignment, the study will show that there is a considerable opportunity to justify multifunction equipment by time saved only. Note that there are many other advantages to MFE (Chapter VI).

- The respondents stated that about 22% of office personnel are secretaries. This result also agrees with data obtained from the United States census document.

  - Secretarial personnel are divided into two categories which are executive secretaries and clerk/typists.

    . Sixty-seven percent of the secretarial personnel are clerk/typists.

    . Thirty-three percent of the secretarial personnel are executive secretaries.

  - Exhibit III-5 shows that an executive secretary spends about 32.5% of her time performing typing functions and earns (summer 1978) from $595 to $1,350 per month. A clerk/typist spends about 60% of her time typing and earns from $520 to $1,031 per month.

  - Typing rates, percentage of time spent retyping (which can be very significantly reduced by text processing and is now 9.3%) and number of copies per typed page (2.6%) are all shown in Exhibit III-6.

- The key analysis of this section is shown in Exhibits III-7 and III-8. Exhibit III-7 shows the cost factors involved in typing obtained by taking an average secretary's salary and adding 50% overhead. A cost per week for an executive

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EXHIBIT III-5

SECRETARIAL AND CLERICAL COSTS
AND TIME DISTRIBUTION

SALARIES AND TIME DISTRIBUTION	SECRETARIES	CLERK/ TYPISTS
SALARIES ($ PER MONTH)		
> AVERAGE ($ PER MONTH)	$1,025.	$765.
> RANGE ($ PER MONTH)	595.-1,300.	520.-1,031.
TIME DISTRIBUTION		
HOURS PER DAY (% OF TIME)		
ADMINISTRATIVE	2.8-(35%)	0.5-(6.25%)
TYPING	2.6-(32.5%)	4.8-(60%)
DICTATION	0.5-(6.25%)	-
COPYING	0.6-(7.5%)	1.2-(15%)
PHONE	1.5-(18.75%)	1.5-(18.75%)

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EXHIBIT III-6

SECRETARIAL AND CLERICAL TYPING RATES

TYPING STATISTICS	WORK OUTPUT
TYPING RATE (TYPED PAGES PER MINUTE)	6.4 PAGES
PERCENT OF PAGES RETYPED	9.3%
EFFECTIVE TYPING RATE (PAGES PER MINUTE MINUS PAGES WHICH MUST BE RETYPED)	5.8 PAGES
COPIES/TYPED PAGE	2.6 COPIES

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EXHIBIT III-7

COST FACTORS INVOLVED IN TYPING

JOB TITLES	COST
• CLERK/ TYPIST	
AVERAGE SALARY	$183 PER WEEK
AVERAGE COST AT 50% OVERHEAD	$273 PER WEEK
AVERAGE COST PER HOUR	$6.8 PER HOUR
AVERAGE COST FOR TYPING PER WEEK (60% TIME TYPING)	$164 PER WEEK
AVERAGE COST FOR TYPING PER MONTH (4.3 WEEKS PER MONTH)	$705 PER MONTH
• EXECUTIVE SECRETARY	
AVERAGE SALARY	$232 PER WEEK
AVERAGE COST AT 50% OVERHEAD	$348 PER WEEK
AVERAGE COST PER HOUR	$8.7 PER HOUR
AVERAGE COST FOR TYPING PER WEEK (32.5% TIME TYPING)	$113 PER WEEK
AVERAGE COST FOR TYPING PER MONTH (4.3 WEEKS PER MONTH)	$486 PER WEEK

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EXHIBIT III-8

VALUE OF ADDING TEXT EDITING

NUMBER OF EMPLOYEES PERFORMING TYPING FUNCTIONS	COST/MONTH SPENT TYPING (IN DOLLARS)	AT 20% SAVINGS VALUE/MONTH OF TEXT EDITING	TOTAL VALUE AMORTIZED OVER 36 MONTHS
1 CLERK/TYPIST	$705	$141	$5,076
2 CLERK/TYPIST	1,410	282	10,152
1 EXECUTIVE/ SECRETARY	486	97	3,492
2 EXECUTIVE/ SECRETARY	972	194	6,984
3 EXECUTIVE/ SECRETARY	$1,458	$291	$10,476

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secretary, and for a clerk/typist can be derived. Utilizing the percentage of time spent typing, the cost per month for typing is obtained for a:

- Clerk/typist. This is $705 per month and at 5.8 pages per hour is $1.21 per page (including retyping).

- Executive secretary. This is $486 per month and at 5.8 pages per hour is $1.55 per page (including retyping).

- When the above costs are examined and it is assumed that a 20% decrease in typing cost can be obtained through text editing (this is about double the retyping time) it can be seen that the savings equated in equipment amortized over three years are:

  - $5,076 for each clerk/typist.

  - $3,492 for each executive secretary.

- This cost is quite conservative as an estimate to the value of adding text editing to another type of system, and even if it is assumed that a user will want to obtain even greater cost savings, the cost benefit for text editing multifunction equipment exists now. Workstation add on cost of $3,500 to $5,000 are even now obtainable with a typewriter output device or with a keyboard and CRT display.

G. SATISFACTION WITH CURRENT PRODUCTS AND SERVICES

- Interviewees were asked whether or not they were generally satisfied with current products and services. The results are presented in Exhibit III-9.

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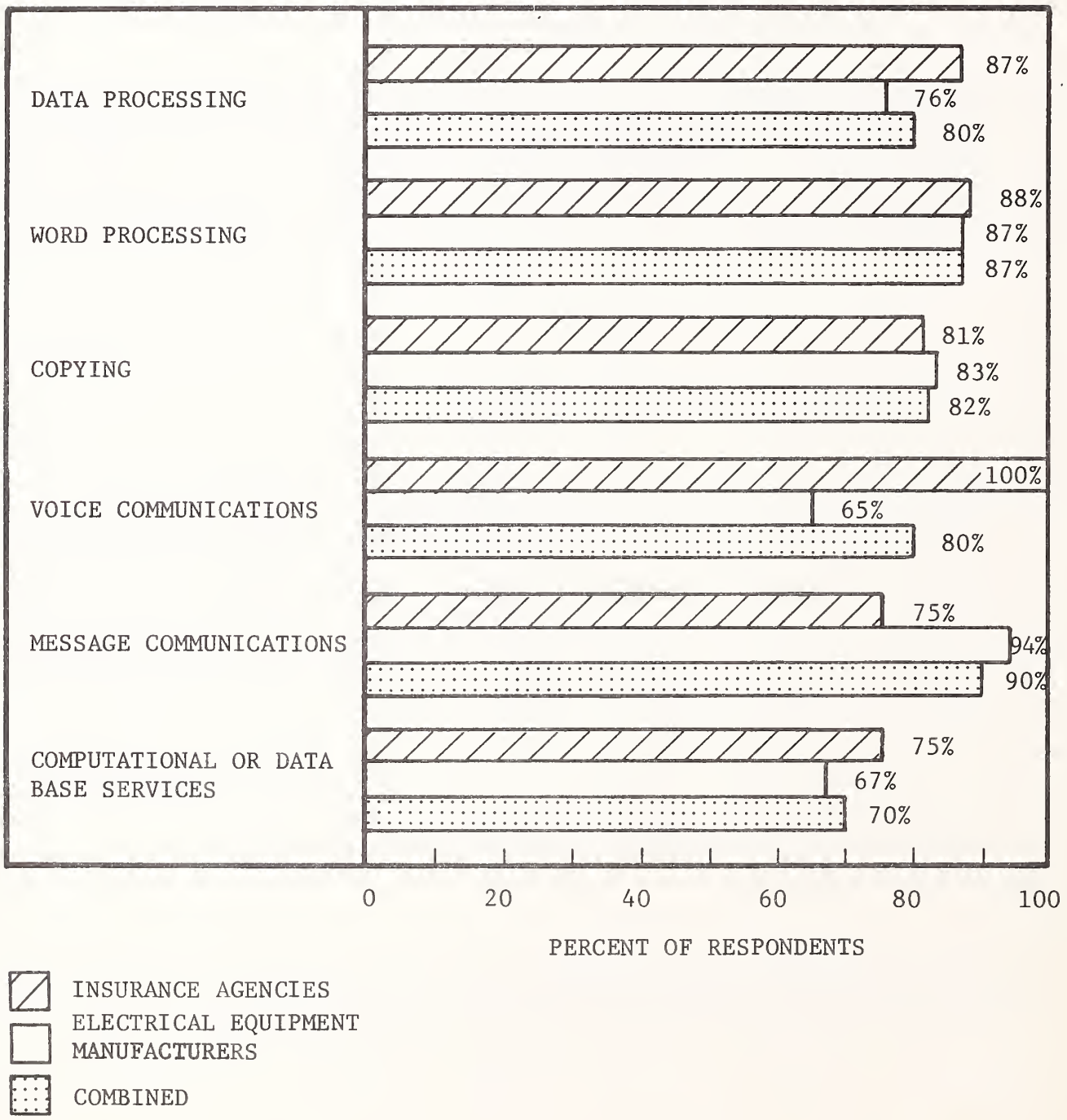
EXHIBIT III-9

PERCENTAGE OF RESPONDENTS EXPRESSING SATISFACTION WITH CURRENT PRODUCTS OR SERVICES



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- The results are generally favorable as would be expected since most interviewees had direct responsibility for the purchase of the products and services.

- The most significant difference between insurance agencies and manufacturing responses was in the area of voice communications where 100% of insurance agencies expressed satisfaction and only 65% of manufacturing companies were currently satisfied.

- Despite the general "satisfaction" with current systems, changes are being planned or considered in many areas. (See Exhibit III-10.)

  - While 80% of the interviewees expressed satisfaction with current systems, 56% are considering a change in their data processing systems.

  - Eighty-eight percent of non-manufacturing companies expressed satisfaction with current word processing operations, but 63% were contemplating a change.

  - Forty-eight percent of manufacturing companies are considering changes to their phone systems, which could be anticipated from the relative lack of satisfaction with current systems.

  - It is possible that the areas considering change despite expressed satisfaction represents current vendor marketing intensity in small establishments.

- Despite the general sense of well being, on-site interviews revealed feelings of dissatisfaction in two areas:

  - Data processing services were felt to be slow and not responsive to specific user requirements

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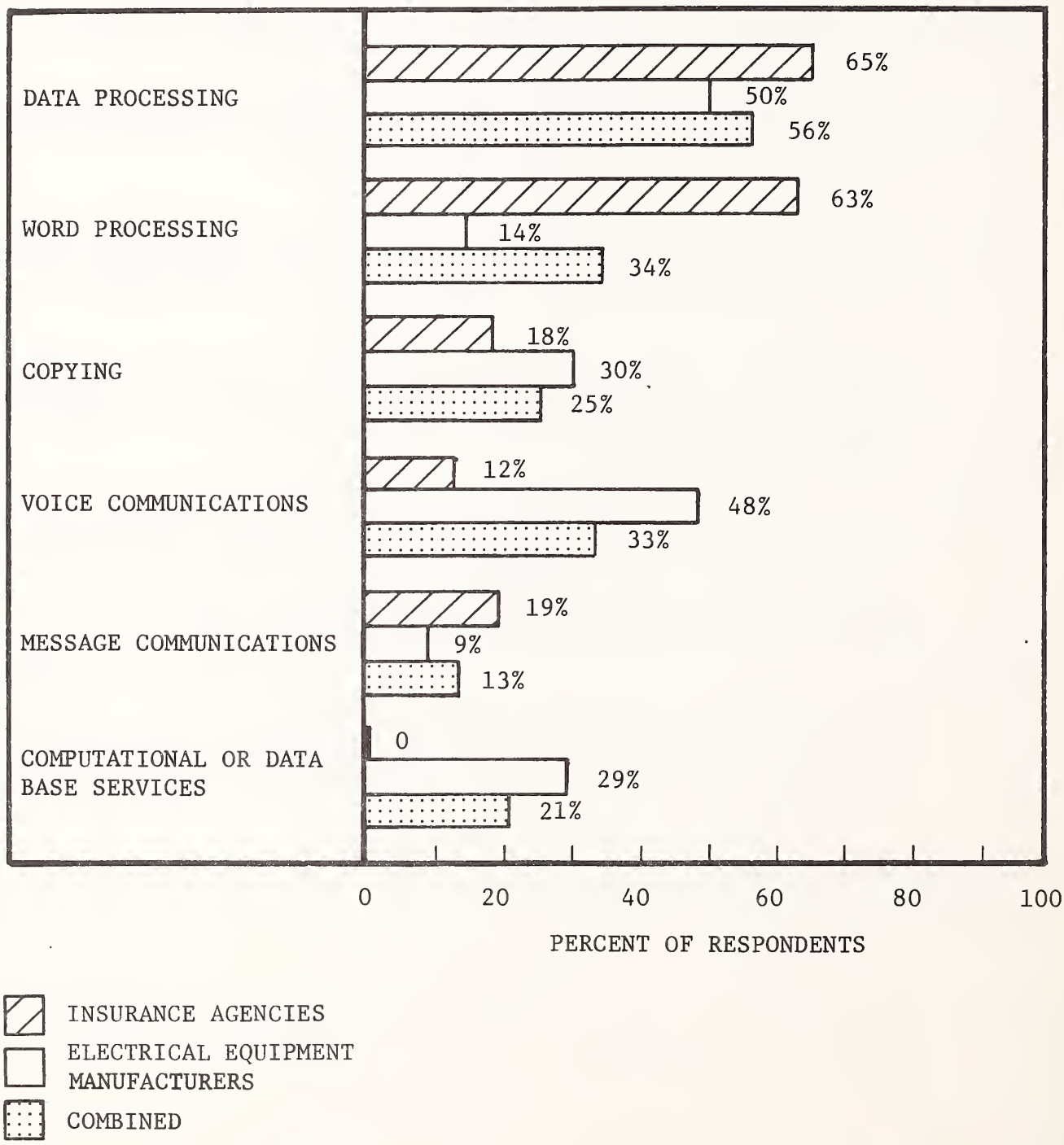
EXHIBIT III-10

PERCENTAGE OF RESPONDENTS PLANNING OR CONSIDERING A CHANGE IN CURRENT PRODUCTS OR SERVICES



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- Cost (especially for copying and voice communciations) was felt to be too high but accepted as being inevitable.

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IV DEFINING MULTIFUNCTION EQUIPMENT FOR POTENTIAL USERS

IV DEFINING MULTIFUNCTION EQUIPMENT FOR POTENTIAL USERS

A. THE CONCEPT AND IMPETUS

- Only after the user interviewees had answered questions concerning their current systems and costs were they informed of the concepts and potential advantages of multifunction equipment (MFE).

- The availability of small cheap computers for specific purposes (data processing, word processing, computerized communications systems, consumer products, etc.) was briefly explained. All of the interviewees were generally aware of these trends.

- The parallel trend in communications costs currently available through value added networks and the potential future savings through satellite services (SBS) and new Bell System offerings (ACS) were less understood.

- The merging of computer and communications technologies into integrated systems was an entirely new concept to most of those interviewed (although some were vaguely aware there was some controversy about exactly what was communications and what was data processing).

- However, the concept of having common terminals for communications, word processing and/or data processing was easily understood, and no one questioned the technical possibility of multifunction equipment.

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B. THE POTENTIAL ADVANTAGES OF MFE FOR SMALL ESTABLISHMENTS

- It was pointed out that, while an individual system or service might not be justified for a small establishment, the possibility of two or more functions might prove cost effective.

- Less space would be required and the general office environment might be improved by isolating noisy equipment.

- A single vendor would be available for sales, service, and support.

- At this point in the interviewing process, some of the user interviewees seemed most impressed by the fact that someone was really interested in what they thought. Paraphrased comments are as follows:

  - "No vendors understand our specific problems."

  - "They want to sell what they have."

  - "If you were a salesman you wouldn't be here now, but I enjoy talking about this stuff."

  - "There is so much equipment available but none of it is quite right."

  - "It's about time somebody asked what we need."

C. DESCRIPTION OF SELECTED SYSTEMS

- A series of six potential types of multifunction equipment or services were then explained to the interviewee.

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- The theory behind the design of the selected systems is that a vendor will move from his existing product offerings toward the addition of other functions to the system. For example, a small business computer can be augmented with software and hardware to perform text editing; thus, expanding the system functions, the equipment market, and the vendor revenues.

  - This expansion of functions matches the logical market expansion of a typical vendor who first sells additional equipment functions to his existing customer base, then to additional sites in his existing customer base, and then to new customers.

  - Expansion of functions of a product saves engineering costs for the initial system module, and reduces training cost for field sales and maintenance personnel.

  - This approach allows for modular expansion of a system.

- The selected systems which were chosen for this study and which will be analyzed are:

  - Small business computer with text processing as its additional function (system #1).

  - Text editing system with data computation and terminal functions as add on functions (system #2).

  - Office copier with add on functions such as facsimile and computer output printing (system #3).

  - PABX with add on functions of data processing or text processing (system #4).

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- Communications network with add on functions of timesharing, text editing, and data base functions (system #5).

- Timesharing systems with add on functions of electronic mail and communications services (system #6).

- Each of these systems represented the potential entry of a class of vendors into the MFE market, and will be discussed in the following pages.

I. SMALL BUSINESS COMPUTER WITH ADD-ON TEXT FUNCTIONS

- This system consists of the central processing unit, storage unit, communications control unit, operator stations and output printer of a small business computer combined with the text oriented workstations and office quality printer of a text editor (Exhibit IV-1). Because of the large installed base of small business computers and the capability of the central processing unit to perform additional functions, as well as the relatively large number of computer system vendors, this is a "popular" multifunction system.

  Multifunction systems of this type are now being sold by IBM, MAI, and Wang, plus others.

- The system is quite flexible and can perform numerous functions.

  - As an electronic mail (depending on how you define it) terminal by using the communications control, memory storage, and output printer.

  - As a text editing unit by utilizing the central processing unit to perform the sentence and paragraph analysis and the output printer (which must be of office quality) to output the letters and memos. Note that the memory and logical capability of the computer can result in a superior text editing unit. This function was mentioned by many respondents from INPUT's surveys and is an absolutely key function for multifunction equipment derived from small business computers.

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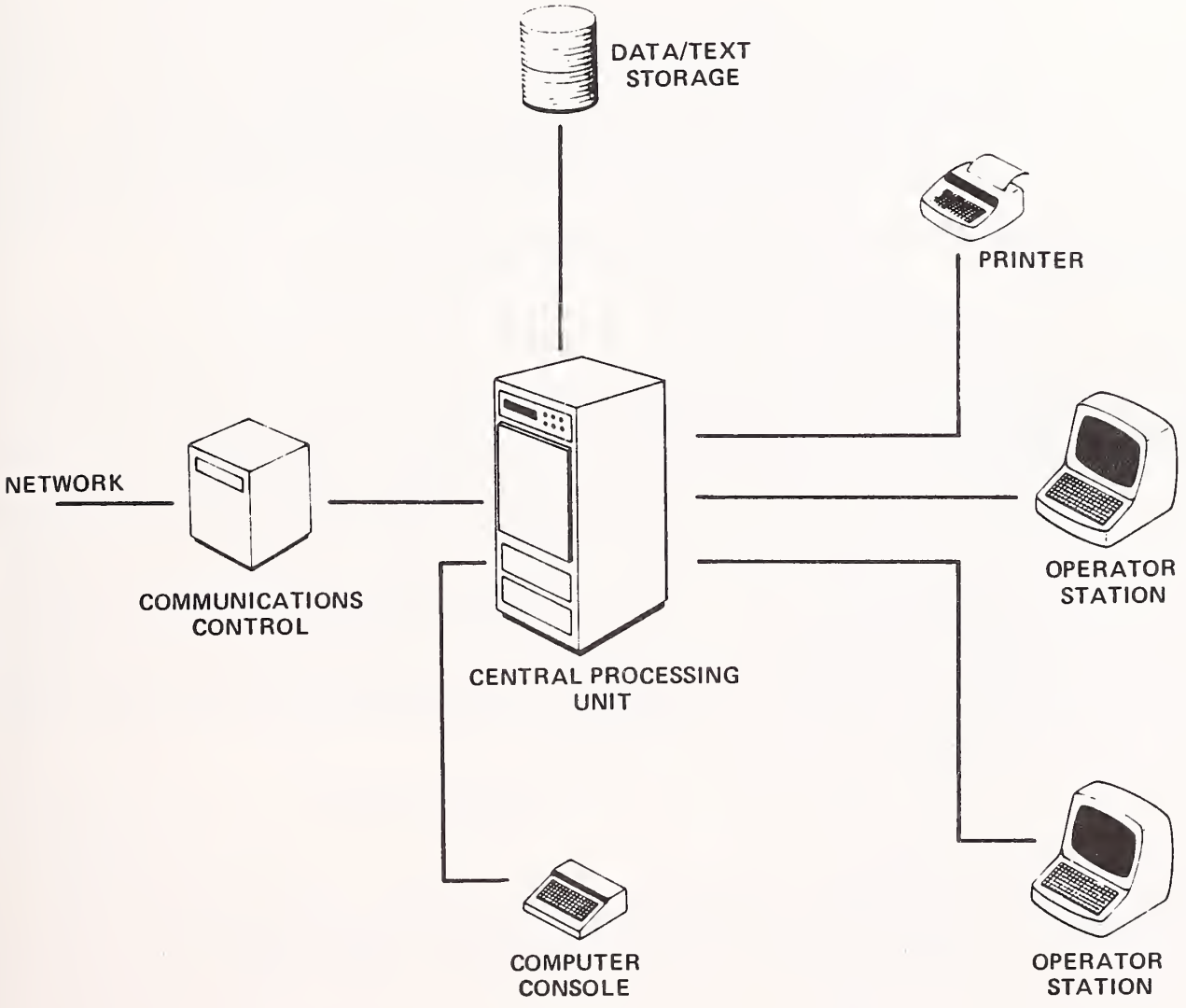
EXHIBIT IV-1

SMALL BUSINESS COMPUTER WITH ADD-ON TEXT PROCESSING

SYSTEM I PRIMARY FUNCTION: SMALL BUSINESS
DERIVED FUNCTION: TEXT EDITING



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- Automatic letter and invoice writing can be considered as a "limited function" type of text editing. However, it is quite important to many business sectors such as insurance and wholesale distribution. This function implies a high speed and high quality output printer such as a "daisy wheel" or ink jet.

- The internal memory and external magnetic storage (such as disc) memory of a computer provides ideal storage for the correspondence of a small business computer/text processing unit. As electronic memory becomes less expensive than paper storage, text storage will become a prime function.

- Real time interrupts can be serviced by the computer, and this will include physical sensors, time clocks, and security sensors. The computer portion of a small business system has ample capability to handle real time interrupts from sensors of heat, power, and entry, as well as time clocks and other "data entry" devices.

- Voice communications can be monitored and controlled by the computer portion of the small business system. This can result in cost control by billing communications cost to the appropriate department and cost reduction by optimum routing of calls among WATS, leased line, and direct dial communications services. The implementation of these functions requires an interface with the PABX communications system which may be hard to implement in some cases (such as an AT&T PABX). However, it is possible to implement communications cost reduction as an important function.

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2. TEXT EDITING SYSTEM WITH ADD-ON COMPUTATION (SMALL BUSINESS FUNCTIONS)

- This system (Exhibit IV-2) is quite close to the small business system (Exhibit IV-1) in its block diagram and implementation. In fact if numbers and text are both considered as information to be processed there is little difference between the two systems in their functional diagrams.

  However, the text editing system will have high quality output printers and CRT displays which can handle upper and lower case alphanumerics and a reasonable portion of a page of text. Along with text processing this system can perform data processing functions such as:

  - Computation and data storage which require arithmetic logic, application programs, and high level programming aids.

  - Data and file storage can be accomplished by the text storage portion of a text editing system. The functions are similar.

  - The inclusion of a communications control unit in an "intelligent" text processing system allows it to interface to communications networks and perform the functions of:

    . Data terminals.

    . Electronic mail terminal.

    . Message control.

    The high quality output displays and printers of a text processing system make it ideal for an electronic mail terminal.

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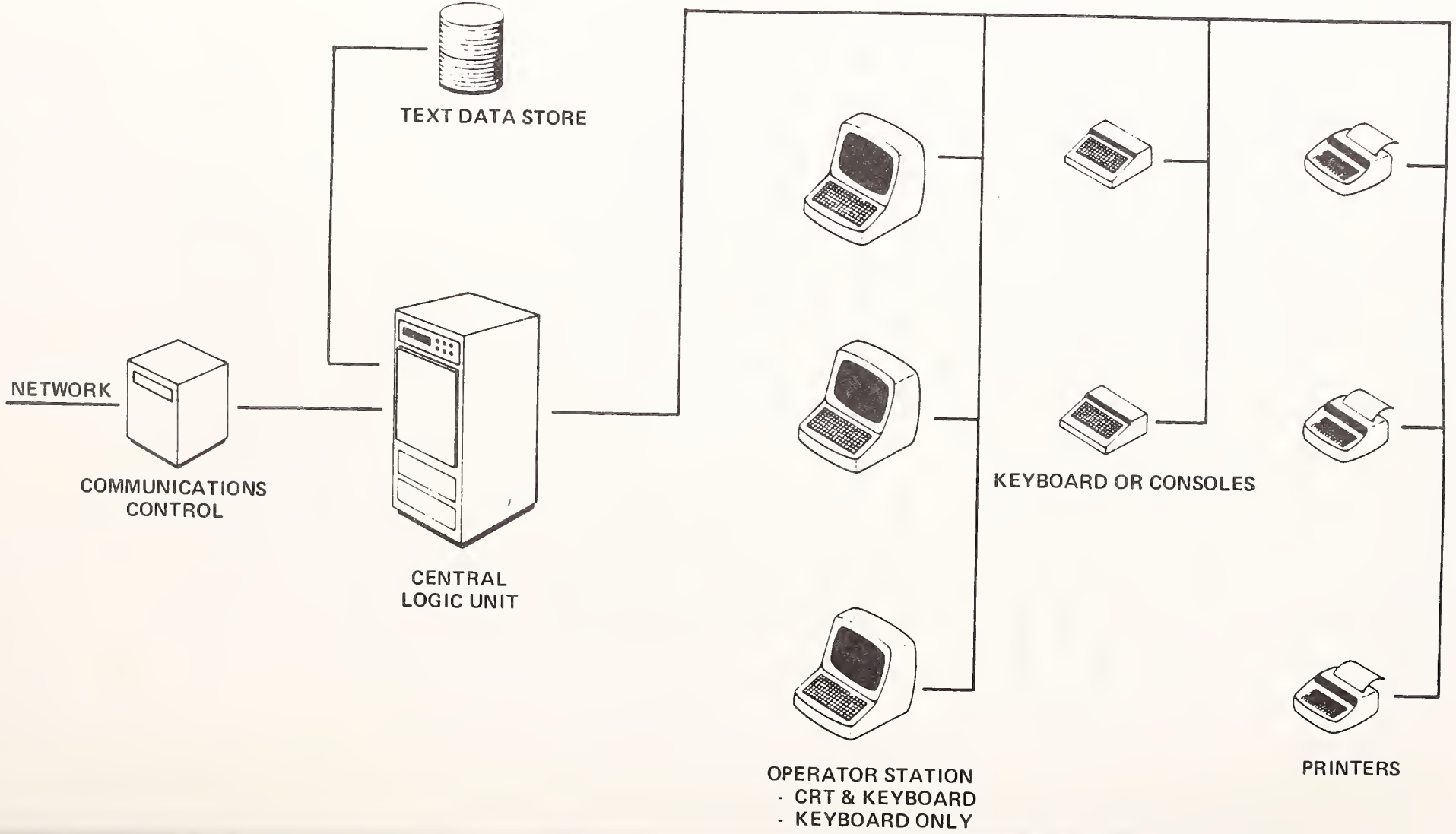
EXHIBIT IV-2
TEXT EDITING SYSTEM WITH ADD-ON COMPUTATION FUNCTIONS

SYSTEM II PRIMARY FUNCTION: TEXT EDITING
DERIVED FUNCTION: SMALL BUSINESS TERMINALS



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3. COPIER WITH ADD-ON FUNCTIONS OF FACSIMILE AND OUTPUT PRINTER

- A sophisticated copier already performs the complex functions of paper control and paper movement and the function of placing images on the paper. In many cases this is the most difficult and expensive function to implement.

  If an electronic character or graphics generator is added to the system (such as a laser to mark images) then additional functions can be performed.

  Because copiers are used in every office, and because they are provided by major vendors such as Xerox, IBM, and 3M they are an important entry point into multifunction equipment, although it is an entry point which has not been utilized very much yet.

  The system (see Exhibit IV-3) includes the copier itself and an electronic character generator and central control unit. These units are the portion of the system which converts the copier into an output device. Once the output device exists then the function to be performed depends upon the ancillary logic. These functions include:

  - Facsimile - when the optical portion of the copier is used as a scanner for input and when the character portion of the device, plus the copier, becomes the output device.

  - The memory and character generator allow the device to be a high speed output printer for a computer or a text processor system. Because a copier can operate at a page a second (which is 50 lines/second or 3,000 lines/minute), it is an extremely fast output printer.

  - An electronic mail terminal exists when a communications control unit is added to the system. Note that this can include graphics, which is extremely important for electronic mail as well as text.

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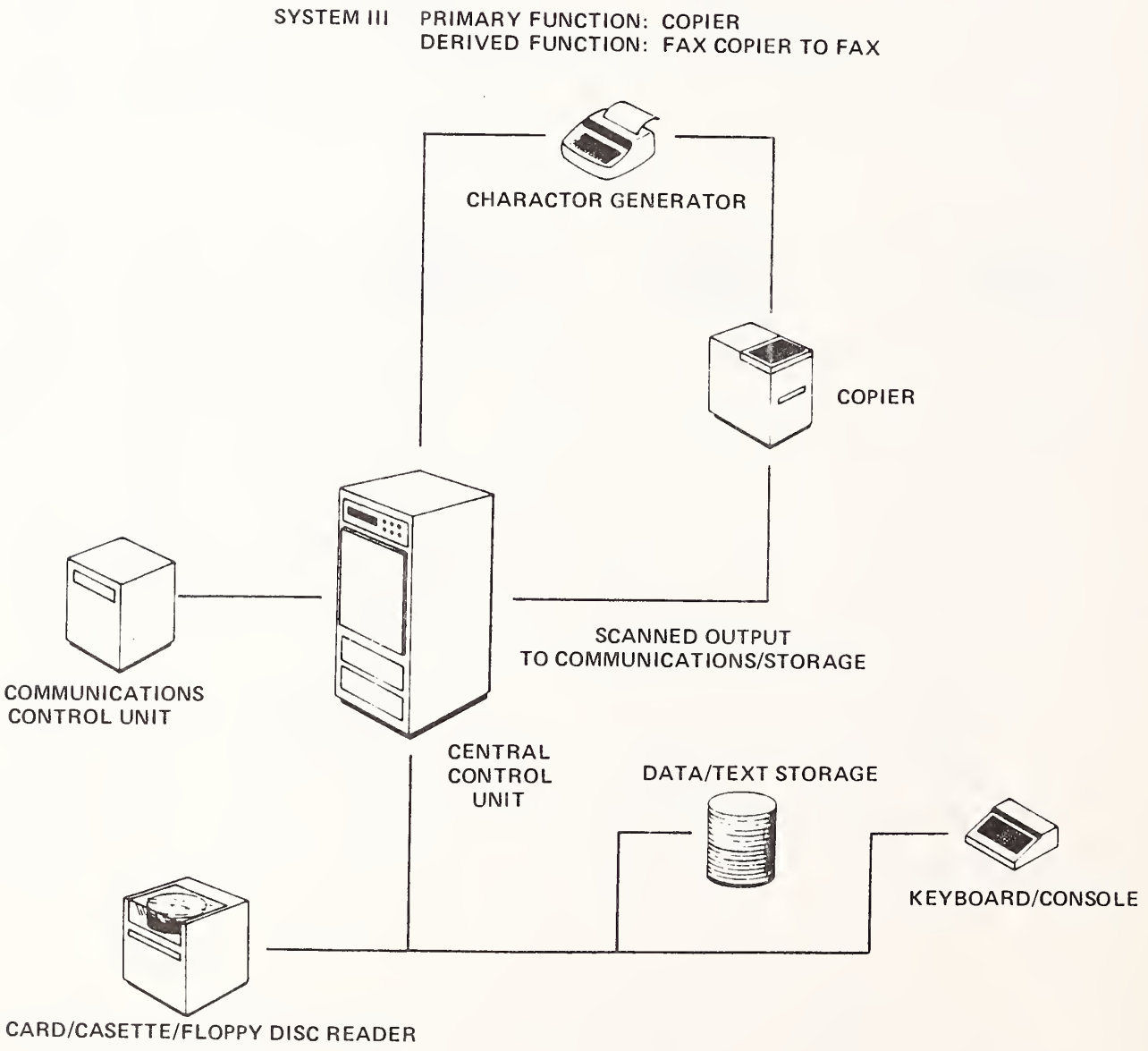
EXHIBIT IV-3

COPIER WITH ADD-ON FUNCTIONS OF FACSIMILE AND OUTPUT PRINTER



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- Text justification and photocomposition both involve the ability to electronically change graphics. This device can also perform those important functions.

4. PABX AS THE PRIME FUNCTION AND DATA OR TEXT PROCESSING AS THE SECONDARY FUNCTION

- The modern PABX utilizes a computer to control communications functions, and this computer can also be used for data processing or for text processing. Note that there is no reason for the communications functions or communications lines to be involved in the system since it is only the computer capability which is wanted (Exhibit IV-4).

This type of system is important because every company uses voice communications and because PABX vendors such as AT&T, ITT and Bell Canada (Northern Telcom) are such major vendors that their potential actions are significant.

By using the computer to perform information processing operations, the PABX can also perform the functions of:

- Communications control (already a sophisticated PABX function) which includes billing users for the communication functions they perform and least cost routing.

- Data processing which uses the PABX computer as the central data processing unit but also adds terminals for input/output.

- Text processing which is a similar system to data processing however with a high quality output printer.

- Terminal and electronic mail functions.

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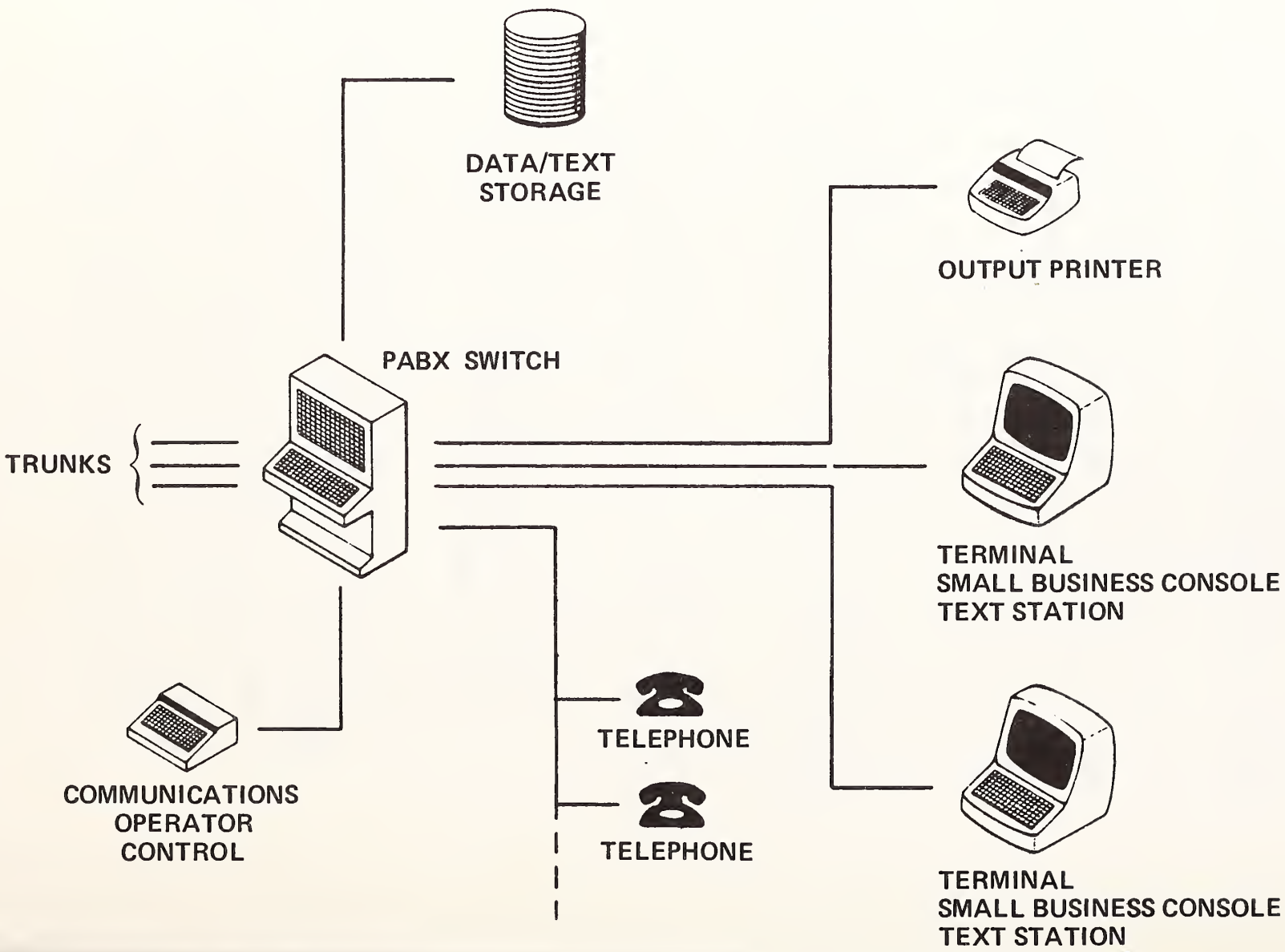
EXHIBIT IV-4

PABX WITH ADD-ON FUNCTIONS OF DATA AND TEXT PROCESSING

SYSTEM IV PRIMARY FUNCTION: PABX
DERIVED FUNCTION: SMALL BUSINESS COMPUTER
TEXT EDITOR
DATA TERMINAL



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5. COMMUNICATIONS NETWORKS TO ALSO PERFORM INFORMATION PROCESSING

- In this class of systems (Exhibit IV-5) the intelligence used to operate a communications network is also used for processing the information. At the present time there are considerable legal and regulatory problems with such systems. However, this study will show how receptive a user whould be to such a system if it could be sold.

  Because intelligent networks such as packet switching use computers to format, store, and move information the next step, which is operating upon the information, can be taken. The system can perform the functions of:

  - Timesharing data analysis.

  - Remote text editing and processing (which is essentially timesharing with text instead of numbers).

  - Data base distribution by the network, and control of the access to the data base. The data base can be owned by:

    . The communications vendor.

    . A third party.

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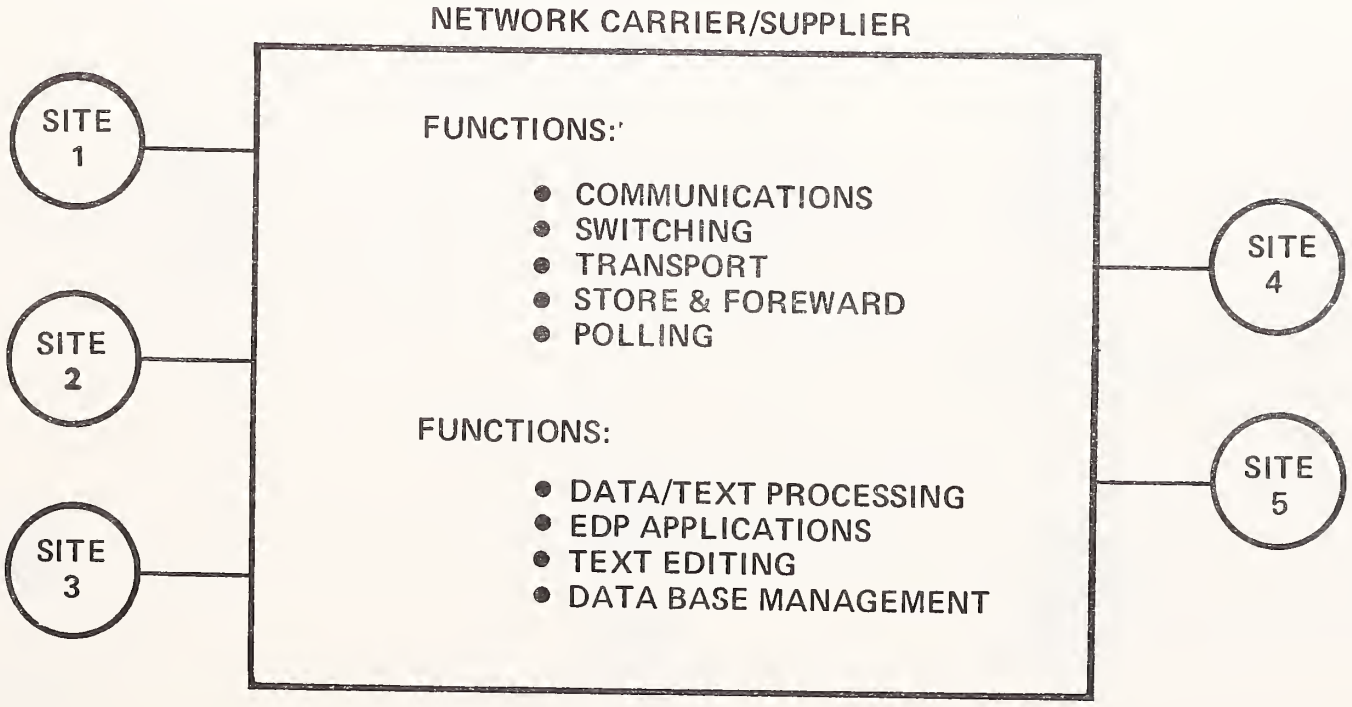
EXHIBIT IV-5

COMMUNICATIONS NETWORKS TO ALSO PROVIDE DATA PROCESSING

SYSTEM 5 PRIMARY FUNCTION: COMMUNICATIONS
6 PRIMARY FUNCTION: REMOTE COMPUTATION

- COMMUNICATIONS
- INFORMATION PROCESSING & STORAGE
- TEXT PROCESSING
- DATA PROCESSING
- INFORMATION STORAGE



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6. TIMESHARING SYSTEMS PERFORMING COMMUNICATION FUNCTIONS

- These systems (Exhibit IV-5) are similar to the communications systems which process information. In fact the only difference is that the vendor is logically a timesharing company and that the communications function is derived from timesharing instead of the reverse. The same legal issues are involved in timesharing companies selling communications as in communications companies selling timesharing and it is still prohibited. This study will not address the legal issues but will only address the question of is the user interested.

  The functions which are possible are the use of timesharing facilities to provide:

  - Electronic mail and message service which include:

    . storing

    . distributing

    the information.

  - Communications services such as:

    . Packet switching.

    . Compatibility.

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V VENDOR AND INDUSTRY ANALYST REACTION TO MULTIFUNCTION SYSTEMS AND SERVICES

V VENDOR AND INDUSTRY ANALYST REACTION TO MULTIFUNCTION SYSTEMS AND SERVICES

A. THE SIGNIFICANCE OF MULTIFUNCTION SYSTEMS AND SERVICES

- The best way to gauge the significance of MFE is by the actions of the competitors rather than by what they say. None of the systems presented in the previous chapter are original concepts of this study. All were prompted by technical developments already announced or reported by one or more vendors.

- After most of the research for this study was completed, on three consecutive weeks the following announcements were made:

  - Xerox announced plans for a domestic digital communications network (Xten) utilizing satellite for intercity transmission and radio links for local distribution. The network would be available for "document distribution, data transmission, and teleconferencing." System #3 would certainly get a boost from such a network.

  - The Bell System explained some of the offerings of ACS. ACS would relieve host CPU's of certain tasks (depending upon user application), but ACS itself could not be used as a data base system. However, the user's bill would be based on: packets or bytes transmitted, networks resource units (NRU's) used, network storage used as a function of time, and elapsed network time. Substitute EXCP's for packets, computer resource units for NRU's and on-line storage for network storage, and

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you have all the elements to develop a billing algorithm for a computer services company. (A week earlier, Bell announced three additions to the Dataspeed 40 terminal series.)

- GE Information Services Division announced Marklink which supports distributed processing with "transaction processing-oriented systems." While emphasis is on the processing, message store-and-forward is an easily developed application.

- The postal service is "progressing" on electronic mail which is part of the postal service's Electronic Computer-Oriented Mail (ECOM). This prompts considerable speculation about what the difference is between "electronic mail" and "electronic message services." There are even those who shun the use of the term "electronic mail" for fear the U.S. Postal Service will claim sole responsibility for service.

o The important fact is that as communications and computer technologies merge, all major corporations in both technologies must position themselves to take advantage of the opportunities which will become available. IBM threw down the gauntlet years ago when it invested in Satellite Business Systems.

o All vendors and analysts were obviously familiar with the competitive environment and consider MFE as an inevitable trend. Comments included:

- "No stopping it."

- "Yes, data processing and word processing are the same."

- "Yes, it is certainly shaking up traditional concepts in the FCC."

- "No one vendor has the solution, but they are all heading in that direction."

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- "If you consider carving up the biggest potential market in the world a major trend then, yes."

- "I saw secretaries in IBM invent multifunctional equipment using ATS terminals to send messages and documents around the country - and yes, the same terminals could be used for timesharing."

- "It's more than a major trend, we have lists of major trends in this industry."

- Vendors were asked whether users wanted MFE. Comments are as follows:

  - "Yes, intuitively, but they don't understand MFE and they don't understand their real requirements."

  - "They need it and will want it once they understand."

  - "They are already using it - this is not new."

  - "If they don't, now they will."

  - "We may have to explain the advantage to them."

  - "There is nothing complicated about it in its simplest form and, yes, users do want it."

- The primary benefit to users was practically universally agreed to be cost savings. But other benefits were identified as well:

  - "Communications are still clumsy. Combining data processing and communications will help."

  - "It will make people in an office environment more responsive."

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- "Management control will be improved - this is a tangible benefit."

- "Sending paper all over the place creates confusion - MFE, if properly applied, will simplify the end user's problems - that's what it's all about."

- "Jimmy Carter said he could read faster than he could talk. Whether face to face or on the phone, voice communications is not necessarily the best in every situation. MFE will provide alternatives (other than paper)."

- "It will improve employee productivity."

- "It will make new services available - especially to the small user."

- There was practically universal agreement that all sizes and types of industries would be attracted to MFE. However, one interviewee stated the following types of organizations would be most attracted to MFE:

  - Small organizations or large organizations with small branches.

  - Any office-oriented, paper-oriented business.

- Vendors stated the following advantages of MFE:

  - "Open up new market areas, such as offices."

  - "Grow current customers by adding functions."

  - "Expand product lines."

  - "Increase sales."

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- The disadvantages of MFE from the vendor's point of view were described as follows:

  - "Marketing is a problem. We've got systems people, and girls who have sold office equipment - neither group can sell the new products."
  - "MFE forces complex products - especially the software."
  - "It's difficult to support and maintain."
  - "You can really build a Kluge."
  - "Without standards, the whole thing is going to be a mess."
  - "Some vendors will promise anything and not deliver - this could kill some good concepts."
  - "Too complex for some users."
  - "Systems development to solve new problems."
  - "Everybody wants something different, and the computer industry is still selling black Model T's in software."
  - "It's complicated to make things simple."
  - "The government is going to get more involved in the business, but we have to go that way."
  - "If the user can't use the additional function, the product isn't competitive."

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B. THE COMPETITIVE ENVIRONMENT AND POTENTIAL IMPACTS

- As would be expected, many interviewees used the symbolic representation of IBM and Bell as the most serious confrontation between the computer and communications industries. However, some of the remarks were significant:

  - "It's like watching World War II in slow motion."

  - "I'm not worried about IBM and Bell, I'm worried about the little guys in between."

  - "The biggest confrontation may be between private enterprise and the United States Government."

  - "IBM and Bell aren't going to hurt each other that much."

  - "Confrontation, what confrontation?"

  - "IBM doesn't have to wait for SBS, they can exploit the area which isn't regulated - the office communications equipment."

  - "It's hard to feel sorry for a $37 billion corporation, but I think IBM has Bell over a barrel."

  - "All carriers and all computer companies are involved - and don't forget the other big guys like Exxon sniffing around."

  - "Don't forget the postal service, they are getting more aggressive, and the courts are already getting involved."

- There seems to be a growing opinion in some areas that the competitive environment will be determined by regulation rather than technology.

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C. MARKET AND TECHNICAL ANALYSIS BY SYSTEM

- Since they are personally involved, the vendors interviewed obviously had their own points of view concerning the relative merits of the six systems specified in the previous chapter. There are so many points of view that statistical tabulation of results are meaningless. However, it is possible to establish a general consensus.

- Consensus opinions concerning the various systems were established by evaluating both the answers to questions and the source. The results are presented in Exhibit V-1.

- It was felt that all systems were technically feasible, but less confidence was expressed about Systems #4 and #5. The reasons are as follows:

  - A PABX was not felt to be a logical building block for the types of systems under consideration. Comments included:

    . "IBM isn't going to do it, and Bell can't - the rest are too small."

    . "If they start building complex systems on that basis they will really be in trouble."

    . "It's like the tail wagging the dog."

    . However, it was felt that: "You can't isolate it from the total communications problem."

  - Comments concerning System #5 included:

    . "It won't come from that direction."

    . "They (VANs) will be left in the starting gate."

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EXHIBIT V-1

CONSENSUS OPINIONS ON
SYSTEMS VIABILITY

	IS IT A REASONABLE APPROACH (TECHNICALLY)	PROBABILITY OF SUCCESS?	WHICH INDUSTRIES?	WHICH VENDORS? (1)
SYSTEM #1	YES	EXCELLENT	ALL	MAJOR VENDORS
SYSTEM #2	YES	GOOD	LEGAL PUBLISHING	MANY VENDORS
SYSTEM #3	YES	FAIR-EXCELLENT	NEARLY ALL	IBM XEROX
SYSTEM #4	DOUBTFUL-MAYBE	POOR-FAIR	ALL	NO CONSENSUS
SYSTEM #5	REASONABLE, BUT NOT PRACTICAL	ISSUE IN DOUBT	ALL	EXISTING PLUS NEW ENTRIES
SYSTEM #6	YES	FAIR-EXCELLENT	ALL - EMPHASIS ON SMALL	ALL CURRENT PLUS OTHERS

(1) FOR HARDWARE SYSTEMS THE RESPONDENTS DID NOT CONSIDER THE DISTRIBUTION CHANNELS (SYSTEMS INTEGRATORS).

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- "Bell will push as far as possible, but they can't afford to go over the line."

- The probability of success of the various systems in the marketplace can be summarized as follows:

  - System #1 was considered to be already successful in some instances (respondents did not necessarily identify exactly what a "small business system" was) and felt it was the best logical building block.

  - System #2 was felt to be appropriate in circumstances where the most immediate cost savings could be achieved from text processing.

  - System #3 was felt to be a doubtful success for implementing conventional word processing, but copiers being used as facsimile terminals were considered inevitable.

  - The general feeling seemed to be that voice communications should be loosely connected to the other systems. If PABX was extended to provide word processing and/or data processing, the possibility for failure of System #4 was considered great.

  - The regulatory situation was deemed to place communications carriers at a disadvantage in implementing System #5.

  - Computer services companies were deemed to be in an excellent position to exploit the MFE market, but to quote one respondent: "I don't know whether they have the 'smarts'."

- Generally speaking, the MFE systems were deemed to have universal potential with the following exceptions:

  - System #2 was thought to be especially appropriate for legal and publishing firms.

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- One respondent stated: "Text processors got started in the big law firms. Anyone developing a text processing system for small firms which could handle their accounting (complicated by hourly billing) would have a tremendous market."

- Respondents still had the general impression that computer services companies were especially appropriate for providing network services for small users.

- The question of which vendors were predominant was distorted by careful answers reflecting sensitivity to competition (or lack thereof).

  - All "major vendors" either mainframe or minicomputer were felt to have an excellent possibility with System #1. The reservations about small hardware suppliers was based primarily on their marketing, software systems development, and maintenance and support capabilities. (Once again, alternatives for such activities were not considered.)

  - It was felt that the word processing market would continue to attract new vendors. The basic software support was thought to be reasonably generalized and the business data processing requirements could be satisfied. (The consensus rating for System #2 considers the industry specializations.)

  - IBM and Xerox stood above all others in the office copier based System #3.

  - It was impossible to obtain consensus on System #4. Current vendors such as Rolm and Northern Telephone were mentioned, but the general feeling was that the system is not sufficiently attractive to users to make it viable unless Bell or IBM offered it, and that for both companies the legal and regulatory environment was too complex to encourage much development along this path.

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- Responses to System #5 considered only Bell (ACS) and IBM (SBS) as potential vendors, but again the legal and regulatory obstacles were cited as substantial barriers to an early implementation of this approach by these carriers. New entrants could be more successful.

- System #6 by contrast was felt to be a more feasible approach with Tymshare the most likely vendor. ADP and McAuto could also play a significant role, as could other new entrants.

- Technical (hardware) problems are not considered to be the barrier to successful introduction of MFE, as far as vendors are concerned. If the specific hardware is not already available (many respondents feel that it is), at least the underlying technology is known.

  - Reliability is the major technical concern. To paraphrase one respondent, users are accustomed to computers going down, but not to their telephone system being out of order or their typewriter not working.

  - Since the real power of MFE comes from integrating all aspects of information processing (text, computation, graphics, and communications), interface standards will be a critical issue. It has not yet been adequately addressed. Systems can't be "thrown together," but must be planned for integration from the beginning.

  - Ideally, the user should be able to assemble his MFE from modular components, much as he might assemble a stereo set. Users with more imagination, more complex needs, or simply greater wants and higher budgets can put together sophisticated systems while other users will be satisfied with basic capabilities and standard packaging.

  - One implication of this approach is that it is the end user terminal which will be multifunctional, rather than the large central processor. This level of sophistication in terminal technology already exists, but the overriding question of systems architecture is less settled.

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- The quality of the software, therefore, can make or break MFE. Small vendors are at their greatest disadvantage in this area because of the necessity to pioneer in tying together the diverse areas mentioned above into a maintainable architectural form.

  - Experienced communications software designers are still a rare commodity, especially when the requirement involves familiarity with more than one of the major communications techniques.

  - Maintenance and support of the resulting software imposes huge additional burdens with which smaller vendors can rarely cope.

  - Later establishment of a different de facto standard has doomed many a smaller vendor who chose not to wait and see what the major vendors did.

- On the other hand, no super operating system is required or desired by the small user. The use of multiple dedicated microprocessors can simplify the software design for each component and may allow a "black box" kind of approach to each of the multifunctions.

  - The software problem is not insoluble by any means. Once the communications services become available, the most difficult interfaces will have been defined and the rest should be comparatively easy.

- In any case, it is felt that software development will represent the significant portion of the vendor's cost, rather than the hardware.

  - Consequently, it may be necessary to impose an explicit charge for the software, depending on its capabilities and use, rather than to sell the MFE at a bundled price.

- Applications support is also a software problem area. While there is some optimism that the problem will be solved ("It always is," says one respondent),

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the applications area is really more difficult for the small hardware vendor than the systems software area is.

- Specific knowledge and analysis of industry applications is lacking.

- The fact that there are many different application packages available for IBM gear is an indication to one respondent that the basic problem has not yet been solved.

- Customization, especially for small users, will always be required.

- Current data base systems are not suitable for use in a DDP environment, and there is some feeling that a totally new approach will be necessary.

- No potential MFE vendor can afford to ignore the question of application support. At the same time, no MFE vendor is enthusiastic about tackling this difficult area.

  - The most likely immediate solution will be a marketing and distribution approach that makes use of local systems houses and analogous channels to provide end user customization and applications support.

- Maintenance is also a distributed function that poses problems for the small vendor. Reliability was cited earlier as the touchstone of success for MFE because the user has come to expect nearly total availability of the office functions which MFE would perform.

  - At the very least, maintenance on site would have to be provided, either by the original vendor organization or a service organization. Telephone maintenance provides a sort of de facto model in the minds of several respondents for the quality level of service that users would expect and require.

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- Other recent studies by INPUT indicate that a possible alternative acceptable to users is a set of built-in diagnostics that can be activated by the user, either resulting in or facilitating plug-board replacement by the user or a local repairman. This solution is more appropriate to electronic than to mechanical problems, however, whereas the mechanical problems are more likely to occur in the MFE.

- Integration of the many maintenance people who are now calling on offices for typewriter repair, copier repair, telephone repair, or computer repair may simplify the service problem rather than complicate it further. Most users would rather deal with a single service agency if the level of service is adequate.

- Respondents were very polarized as to the potential marketing complexities that may be experienced with MFE.

  - One group felt that marketing would be no problem if the proper functions are offered. Marketing emphasis would continue to be placed on the primary functions, since these are all that some users want or need. Secondary function capabilities could then be used to upgrade the account after the initial placement had been made.

  - In supporting this point of view, one respondent said, "Customers are smarter than vendors. If the right systems are available, the customer will buy."

  - Another respondent put it this way: "If it (the MFE) does the job, selling it won't be complex."

- The other group took the opposite point of view. Marketing requires a combination of skills by definition. It is a difficult area to begin with, and a new concept such as MFE may require a new marketing approach.

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- One current vendor emphasized that they consistently tried to keep their qualified salesmen from migrating from one product to another, because they had found separate talents were required in each product area.

- Selling from the top down is a successful approach not only for large accounts, but even more so for small establishments. Again, the implication is that the major vendors who are able to reach top management in the large accounts are more likely to account for the large volume sales.

- Few vendors were able to speak knowledgeably outside their own product area about unique features and characteristics that would be essential in the alternative MFE systems, but Exhibit V-2 presents a compendium of responses for each system.

- On the question of vendor strategies, there is extensive agreement that computing and communications will become more entwined, not less. All of the major vendors appear to be moving as far into the others' areas as legal and regulatory restrictions will allow. Meanwhile, the smaller vendors continue to seek out niches to penetrate while they can, before they are overwhelmed.

  - The underlying drive is to integrate functions while distributing intelligence.

  - MFE is, therefore, inevitable; the only question really is how fast the applications can catch up to the technology.

- The integration of functions is a natural step, and the increased competition that will result is considered beneficial to end users. However, there is a considerable minority opinion that is concerned about the survival of small vendors.

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EXHIBIT V-2

KEY MFE FUNCTIONS AND SUPPORT REQUIREMENTS

SYSTEM TYPE	KEY FUNCTIONS AND REQUIREMENTS
SYSTEM #1 - SMALL BUSINESS COMPUTER PLUS TEXT EDITING	• FILE MANAGEMENT FOR BOTH TEXT AND DATA • TRAINING AND SUPPORT IN WORD PROCESSING • INTEGRATION OF TEXT AND DATA BASES • COMMUNICATIONS SUPPORT INCLUDING ACCOMODATION OF MAJOR NETWORK INTERFACES • APPLICATIONS SUPPORT FOR SMALL USERS • DATA MANAGEMENT SYSTEM WHICH CAN BE UNDERSTOOD BY A FILE CLERK • BUILT-IN DATA DICTIONARIES AND DIRECTORY
SYSTEM #2 - TEXT PROCESSOR PLUS COMPUTATION AND COMMUNICATIONS	• APPLICATIONS SUPPORT FOR DATA PROCESSING • MESSAGE SERVICE SOFTWARE (ELECTRONIC MAIL) • COMMUNICATIONS HARD COPIES • INTEGRATION OF TEXT AND DATA BASES • COMMUNICATIONS SUPPORT INCLUDING ACCOMODATION OF MAJOR NETWORK INTERFACES • KNOWLEDGEABLE SALESMEN WHO UNDERSTAND BUSINESS APPLICATIONS • SYSTEM WHICH TREATS TEXT LIKE DATA AND DATA LIKE TEXT
SYSTEM #3 - COPIER PLUS FACSIMILE AND ACCESS TO COMPUTER	• COMMUNICATION OF TEXT AND GRAPHICS • WORD PROCESSING AND ELECTRONIC MAIL INTERFACES • VERY HIGH RELIABILITY AND MAINTENANCE SUPPORT • COMMUNICATIONS SUPPORT
SYSTEM #4 - PABX PLUS COMPUTATION, DATA TERMINAL, AND TEXT EDITING	• EASE OF USE • HUMAN FACTOR ENGINEERING • DATA RETRIEVAL VOICE RESPONSE • STANDARDIZED INTERFACES • INTEGRATION OF MESSAGE AND WORD PROCESSING • AUTOMATIC (PUSHBUTTON) IDENTIFICATION OF CALLER WHEN LEAVING A MESSAGE

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EXHIBIT V-2 (CONTD)

SYSTEM #5 AND #6 NETWORK BASED DATA AND TEXT PROCESSING	• REMOTE WORD PROCESSING NOT ESSENTIAL • REMOTE SUPPORT AND MAINTENANCE IS ESSENTIAL • GOOD DATA BASE SYSTEMS. • PROPRIETARY DATA BASES. • INDUSTRY INTERFACES. • LOWER COSTS THAN AT PRESENT

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- Only the large firms have the resources to influence the final outcome before Congress, the FCC, and the courts where the real decision will be made.

- Small companies cannot afford the time and expense of preparing lengthy testimony or responses to Federal inquiries, nor can they afford to delay R&D and marketing decisions while the government ponders its rulings. Thus, the small companies are caught in the middle.

- The FCC is felt to be overloaded and not technically equipped to deal adequately with the complexities of the situation and, therefore, likely to add to the confusion rather than resolving it.

- While the final outcome is still in doubt, the majority opinion feels that IBM is better placed than Bell to compete in the MFE market. However, Bell will likely retain its backbone network prominence, together with some enhanced services through the 1980s, even though there will be other new entrants into the private and shared business network arena.

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VI USER REACTIONS TO MULTIFUNCTION EQUIPMENT

VI USER REACTIONS TO MULTIFUNCTION EQUIPMENT

A. GENERAL INTEREST IN MULTIFUNCTION EQUIPMENT

- Insurance agencies were more interested in multifunction equipment than electrical equipment manufacturing establishments. This was true for five of the six systems evaluated, the only exception being System #4 (PABX based). (See Exhibit VI-1.)

- The manufacturing companies are, therefore, consistent in their concern about voice communications expenditures as expressed in Chapter III.

  - Fewer were satisfied with their current systems. (See Exhibit III-9.)

  - Significantly more manufacturing companies were considering a change in their current telephone systems. (See Exhibit III-10.)

- The expression of interest in multifunction systems indicates they would have a positive impact on those small establishments who would consider changes in their current systems. Comparing percentage interested in MFE (Exhibit VI-1) against those currently considering change (Exhibit III-10) reveals the following:

  - Fifty-six percent of the respondents are considering a change to their current data processing systems, but seventy-six percent expressed

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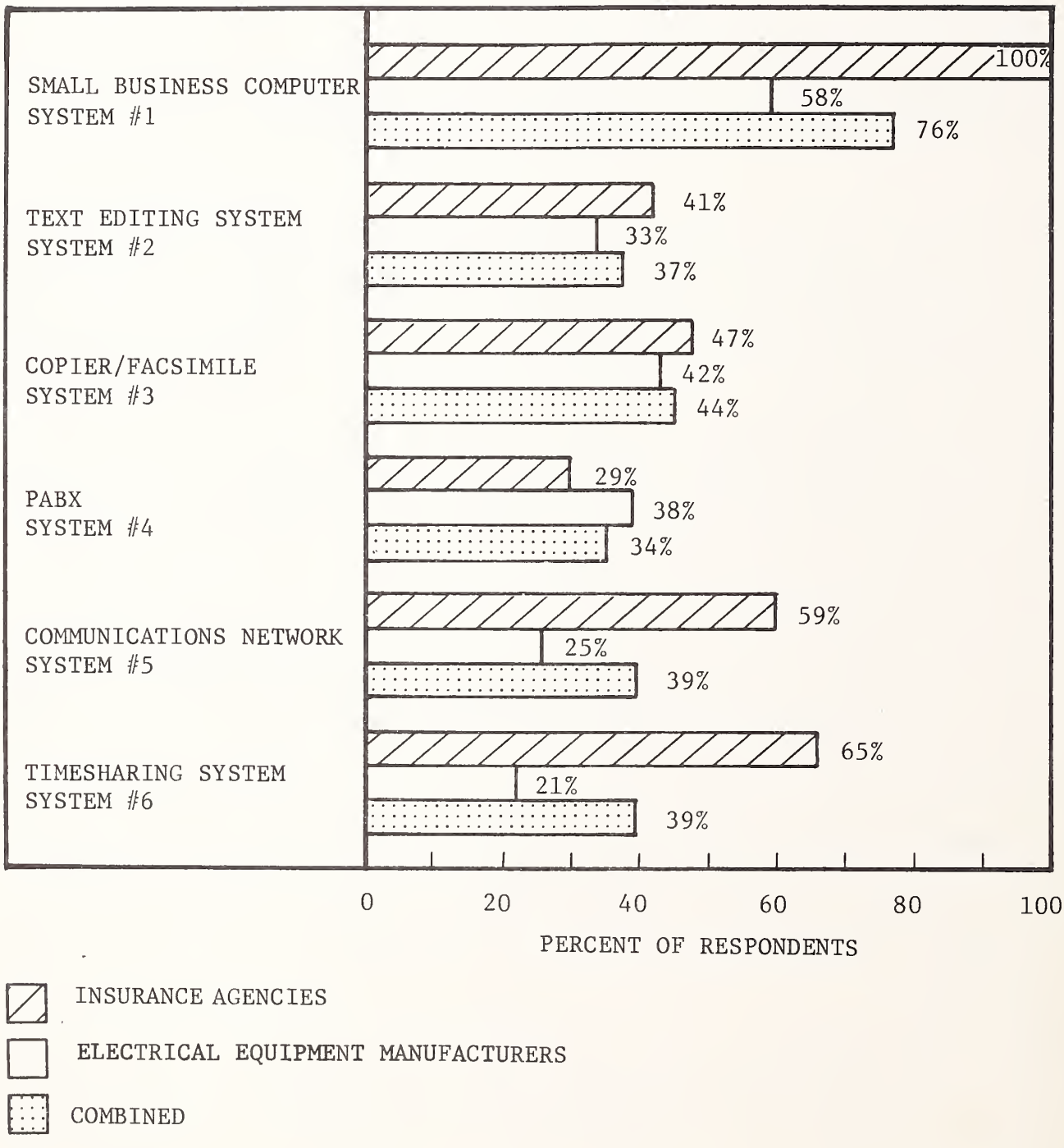
EXHIBIT VI-1

PERCENT EXPRESSING INTEREST

(BY SYSTEM)



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interest in System #1. (Small business computer performing text editing.)

- Thirty-four percent are currently considering new word processing equipment and thirty-seven percent expressed interest in System #2. (Text processing system performing data processing.)

- Twenty-five percent are considering new office copiers, but 44% expressed interest in System #3. (Copier performing facsimile and computer output.)

- Thirty-three percent are considering new telephone systems and 34% expressed interest in System #4. (PABX performing data and text processing.)

- Thirteen percent are considering a change in message services, but 39% expressed interest in System #5. (Communications network performing computation or text processing.)

- Twenty-one percent are considering new computational or data base services, but 39% expressed interest in System #6. (Timesharing company offering message services.)

- Therefore, all six systems generated increased interest in considering new systems solutions. In fact, the overall indications of interest listed above is not as striking as some specific comparisons between the two charts. For example:

  - Only 14% of manufacturing companies are considering word processing systems, but 33% expressed interest in System #2. (Text processing system performing data processing.)

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- Only 18% of insurance agencies respondents were considering a new copier, but 47% expressed interest in System #3. (Copier providing facsimile and computer output functions.)

- Only 12% of insurance agencies respondents were considering new phone systems, but 29% expressed interest in System #4. (PABX performing data and text processing.) In manufacturing companies where 48% are currently considering new phone systems, interest dropped to 38% - probably because they require an immediate solution to their problem.

- Only 19% of insurance agencies were considering new message services, but 59% expressed interest in System #5. (Communications network performing computation and text processing.)

- No insurance agencies were considering new computational or data base services, but 65% expressed interest in System #6. (Timesharing company providing communications services.)

- It can definitely be concluded that multifunction equipment and services stimulate interest in small establishments.

B. THE RELATIVE IMPORTANCE OF MFE SYSTEMS FEATURES AND FUNCTIONS

- Interviewees were asked how important features and functions of the specified MFE systems were from their point of view. Since all features and functions could theoretically be of equal importance, rankings were not forced. However, relative importance was established based on the most important feature (or function) identified for each system and given a rating of 100.

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- System #1 (small business computer performing text processing) generated the most interest among small establishments by a wide margin. (See Exhibit VI-1.) The relative importance of hardware features and functional capabilities are contained in Exhibit VI-2 and revealed the following:

  - Manufacturing establishments tended to rate hardware features of greater relative importance than insurance agencies. This is espcially true for a high speed printer and the communications controller.

  - Both manufacturing and insurance agencies were most attracted by the text editing capability and the related capabilities of office quality printing for correspondence and invoicing.

  - Communications monitoring and control were not considered of great importance by either group. This is probably because of the general feeling that data processing and text processing are clearly compatible, whereas voice communications is a separate problem.

  - Surprisingly, manufacturing was less impressed by the availability of sensor control than insurance agencies. Possible explanations are that companies requiring sensor control in production operations already have such systems installed and the possible reluctance to mix "manufacturing" and "accounting" systems.

- System #2 (text processing equipment performing computation) was not nearly so popular as System #1 as the primary building block when combining data processing and text processing (Exhibit VI-1). The relative importance of features and functions is contained in Exhibit VI-3.

  - Once again manufacturing companies place greater relative importance on most hardware features with the exception of the sensor multiplexor.

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EXHIBIT VI-2

RELATIVE IMPORTANCE OF HARDWARE FEATURES AND FUNCTIONS - SYSTEM #1 - SMALL BUSINESS COMPUTER PERFORMING TEXT PROCESSING

FEATURES AND FUNCTIONS	RELATIVE IMPORTANCE*	
	INSURANCE AGENCIES	MANUFACTURERS ELECTRICAL EQUIPMENT
FEATURES		
OFFICE QUALITY PRINTER	74	100
STORAGE	100	82
HIGH SPEED PRINTER	15	59
COMMUNICATIONS CONTROL	33	73
FUNCTIONS		
TEXT EDITING	82	64
AUTOMATIC LETTER & INVOICES	100	100
TEXT STORAGE	89	54
ELECTRONIC MAIL SYSTEMS	57	36
SENSOR CONTROL	39	18
COMMUNICATION MONITORING	32	36
COMMUNICATIONS CONTROL	36	43

*THE MOST IMPORTANT FEATURE OR FUNCTION IS GIVEN RELATIVE IMPORTANCE OF 100.

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EXHIBIT VI-3

RELATIVE IMPORTANCE OF HARDWARE FEATURES AND FUNCTIONS - SYSTEM #2 - TEXT PROCESSING EQUIPMENT PERFORMING COMPUTATION

FEATURES AND FUNCTIONS	RELATIVE IMPORTANCE*	
	INSURANCE AGENCIES	MANUFACTURERS ELECTRICAL EQUIPMENT
FEATURES		
COMMUNICATIONS CONTROLLER	71	86
ARITHMETIC UNIT	57	100
STORAGE FOR DATA PROCESSING	100	100
10 KEY PAD	43	86
SENSOR MULTIPLEXOR	57	29
MULTI-TERMINAL	57	100
HIGH SPEED PRINTER	57	86
FUNCTIONS		
EDP APPLICATIONS	67	100
EDP STORAGE	33	10
TERMINALS FOR DATA PROCESSING	89	70
TERMINALS FOR MESSAGES	100	30
TERMINALS FOR ELECTRONIC MAIL	78	30

*THE MOST IMPORTANT FEATURE OR FUNCTION IS GIVEN RELATIVE IMPORTANCE OF 100.

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- It is significant that insurance agencies considered the communications capability of System #2 as the most important. This is possibly because of the need to rapidly transmit policies as an electronic mail function.

- Manufacturing establishments, on the other hand, seemed to feel that (given the specified functional capabilities) there was no question that data processing capability was the most important derived function.

- It was relatively easy for interviewees to understand the general concept of using a copier as a communications device, and System #3 (copier performing facsimile and output printer functions) generated a considerable amount of interest. The relative importance of features and functions is contained in Exhibit VI-4.

  - Facsimile output is obviously the most important function with both groups rating it the most important capability.

  - Once again, manufacturing is more concerned about high speed printing than insurance agencies.

  - Justification and type setting capability was not considered of importance.

- System #4 (PABX performing text processing and data processing functions) was difficult for most interviewees to understand and this resulted in the lowest level of interest among all of the systems. (See Exhibit VI-1.) The lack of interest among the general population was not shared by a few enthusiastic proponents of such a system. The relative importance of features and functions for those responding is contained in Exhibit VI-5.

  - More manufacturing establishments rated System #4 of importance, again reflecting the concern about voice communciations services which was identified in Chapter III.

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EXHIBIT VI-4

RELATIVE IMPORTANCE OF HARDWARE FEATURES
AND FUNCTIONS - SYSTEM #3 - COPIER
PERFORMING FACSIMILE AND OUTPUT
PRINTER FUNCTIONS

FEATURES AND FUNCTIONS	RELATIVE IMPORTANCE*	
	INSURANCE AGENCIES	MANUFACTURERS ELECTRICAL EQUIPMENT
FEATURES		
CHARACTER GENERATION/ LASER SCANNER	86	86
COMMUNICATIONS CONTROLLER	100	100
DATA STORAGE	100	56
FUNCTIONS		
FACSIMILE OUTPUT	100	100
MESSAGE/TERMINAL OUTPUT	100	63
HIGH SPEED PRINTER	29	75
JUSTIFICATION/TYPE SETTING	0	13

*THE MOST IMPORTANT FEATURE OR FUNCTION IS GIVEN RELATIVE IMPORTANCE OF 100.

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EXHIBIT VI-5

RELATIVE IMPORTANCE OF HARDWARE FEATURES AND FUNCTIONS - SYSTEM #4 - PABX PERFORMING TEXT PROCESSING AND DATA PROCESSING FUNCTIONS

FEATURES AND FUNCTIONS	RELATIVE IMPORTANCE*	
	INSURANCE AGENCIES	MANUFACTURERS ELECTRICAL EQUIPMENT
FEATURES		
CRT S	INSUFFICIENT DATA	100
KEYBOARDS		100
DATA/TEXT STORAGE		89
OFFICE QUALITY PRINTER		78
HIGH SPEED PRINTER		33
FUNCTIONS		
SMALL BUSINESS COMPUTER		25
TEXT EDITING		75
DATA TERMINALS		100

*THE MOST IMPORTANT FEATURE OR FUNCTION IS GIVEN RELATIVE IMPORTANCE OF 100.

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- It does not appear that the respondents consider a PABX as an important primary system on which to build data processing capability, probably because they did not fully understand its capabilities.

- Text editing and data terminals (for both data entry and information retrieval) were the most important functions. This implies that respondents pictured the PABX system primarily as a controller or concentrator for terminals in a data or text processing environment.

- Insurance agencies companies were substantially more interested in possible new services from communications carriers (System #5 - communications networks providing computation functions) and computer services companies (System #6 - timesharing systems providing communications functions) than were manufacturing companies. (See Exhibit VI-1.) The relative importance of new service offerings is contained in Exhibit VI-6 and VI-7.

  - Remote text editing from communications carriers had very little appeal to either group. This is unquestionably due to the offering of this capability on-site by all of the other systems, and because the pattern of remote text processing by external vendors does not now exist.

  - Proprietary data base services were most attractive to insurance agency establishments whereas timesharing data analysis was most important to manufacturing establishments.

  - The interest in obtaining services from computer services companies by the insurance agencies was probably prompted by the specific requirements of the independent insurance agents interviewed. They currently must attempt to communicate with various vendors (insurance companies) who have non-compatible systems. However, similar requirements are not unusual for small establishments in service oriented industries. For example; hospitals, public accounting firms, and law firms all have the same type of communications problems.

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EXHIBIT VI-6

RELATIVE IMPORTANCE OF SERVICE OFFERINGS -
SYSTEM #5 - COMMUNICATION NETWORK PERFORMING
COMPUTATION FUNCTIONS

SERVICE OFFERINGS	RELATIVE IMPORTANCE*	
	INSURANCE AGENCIES	MANUFACTURERS ELECTRICAL EQUIPMENT
SYSTEM #5		
SERVICE OFFERINGS		
REMOTE EDITING	13	0
TIME SHARING DATA ANALYSIS	50	100
PROPRIETARY DATA BASES	100	50

*THE MOST IMPORTANT FEATURE OR FUNCTION IS GIVEN RELATIVE IMPORTANCE OF 100.

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EXHIBIT VI-7

RELATIVE IMPORTANCE OF SERVICE OFFERINGS -
SYSTEM #6 - TIME SHARING SYSTEM PERFORMING
COMMUNICATIONS FUNCTIONS

SERVICE OFFERINGS	RELATIVE IMPORTANCE*	
	INSURANCE AGENCIES	MANUFACTURING ELECTRICAL EQUIPMENT
SYSTEM #6		
SERVICE OFFERINGS		
ELECTRONIC MAIL	70	INSUFFICIENT DATA
MESSAGE SERVICES	100	
PACKET SWITCHING	80	

*THE MOST IMPORTANT FEATURE OR FUNCTION IS GIVEN RELATIVE IMPORTANCE OF 100.

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C. VALUE OF THE SYSTEMS AS PERCEIVED BY USERS

- Users are frequently reluctant to provide specific information on how much they would be willing to pay for a proposed system. This is not so much a question of being secretive but rather the feeling they cannot make an accurate estimate. It is especially difficult to obtain meaningful results when the systems being described are complex and may be new to the respondent.

- However, it is important to understand how the small establishment user perceives the value of systems. Unlike larger establishments, detailed and comparative cost benefit analyses may not be made in small establishments, and the key to marketing success may be in improving the users perception of potential benefits.

- For the above reasons, users were asked to estimate the potential value of the various systems in a number of different ways. The results from the respondents provided some meaningful information, but also pinpointed an important problem area for vendors; there may be a substantial gap between "user perception" and potential benefits.

- System #1 generated more interest than any other system and users were more responsive to the question of system value. The results are contained in Exhibit VI-8.

  - Twenty percent of the respondents stated they would be willing to pay "at least as much as they currently do" if the system improved employee productivity and responsiveness.

  - Average purchase price which respondents said they would pay for the system was $42,500 for insurance agents establishments and $55,000 for manufacturing companies for those who responded based on purchase price.

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EXHIBIT VI-8

THE VALUE OF MFE AS PERCEIVED BY USERS -
SYSTEM #1 - SMALL BUSINESS COMPUTER
PERFORMING DATA PROCESSING FUNCTIONS

VALUE	INSURANCE AGENCIES	MANUFACTURERS ELECTRICAL EQUIPMENT
PERCENT WILLING TO PAY "AT LEAST AS MUCH" AS REPLACED COSTS	22%	20%
AVERAGE PURCHASE PRICE	$42,500	$55,000
AVERAGE MONTHLY COST	$1,500	$1,100
COST SAVINGS		
PERCENT OF CURRENT COSTS	20%	20%
DOLLAR SAVINGS PER MONTH	$500	N.A.
PAYBACK PERIOD	N.A.	2 YEARS
PEOPLE SAVINGS	N.A.	3 PEOPLE

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- The number who elected to base their response on monthly hardware cost estimates of $1,500 and $1,100 respectively, was not large, but the figures are not out of line with the purchase prices. The monthly cost for insurance agents indicates a 28 month write-off of the purchase price, and manufacturing indicates a 50 month write-off. This is not an unreasonable difference in this type of judgemental answer.

- When value was expressed as a percentage of cost savings, the results were 20% in both categories. (Numerous studies have indicated 20%-25% cost savings are required to consider changing systems.)

- The other results under required cost savings were miscellaneous responses without statistical significance. However, they do demonstrate the different perceptions of savings required to prompt consideration of System #1. There is a substantial spread between $500 per month and the elimination of three employees.

- Under any circumstances, user perceived values are probably not adequate to project any meaningful range of systems prices. A more analytical approach is required, as well as test marketing. (See Chapter III, Section F, Secretarial Cost.)

- Users provided only limited information concerning the value of the other three hardware systems (Systems #2, #3, and #4). The information is presented in Exhibits VI-9, VI-10, and VI-11.

  - Of the users responding for System #2, a high percentage merely stated they would be willing to spend "at least as much" as they are currently spending. (See Exhibit VI-9.) The lack of response reflects the lower interest in System #2 which was generally perceived as a "mirror image" of System #1.

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EXHIBIT VI-9

THE VALUE OF MFE AS PERCEIVED BY USERS -
SYSTEM #2 - TEXT PROCESSING EQUIPMENT
PERFORMING COMPUTATION

VALUE	INSURANCE AGENCIES	MANUFACTURERS ELECTRICAL EQUIPMENT
PERCENT WILLING TO PAY "AT LEAST AS MUCH" AS REPLACED COSTS	75%	50%
AVERAGE PURCHASE PRICE	N.A.	$100,000
AVERAGE MONTHLY COST	N.A.	$1,000
COST SAVINGS		
PERCENT OF CURRENT COSTS	N.A.	>10%
DOLLAR SAVINGS PER MONTH	$500	N.A.

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EXHIBIT VI-10

THE VALUE OF MFE AS PERCEIVED BY USERS -
SYSTEM #3 - COPIERS PERFORMING FACSIMILE AND
OUTPUT PRINTER FUNCTIONS

VALUE	INSURANCE AGENCIES	MANUFACTURERS ELECTRICAL EQUIPMENT
PERCENT WILLING TO PAY "AT LEAST AS MUCH" AS REPLACED COSTS	25%	50%
AVERAGE PURCHASE PRICE	$5,000	$10,000
AVERAGE MONTHLY COST	N.A.	N.A.
COST SAVINGS		
PERCENT OF CURRENT COSTS	20%	20%
DOLLAR SAVINGS PER MONTH	N.A.	N.A.

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EXHIBIT VI-11

THE VALUE OF MFE AS PERCEIVED BY USERS - SYSTEM #4 - PABX PERFORMING TEXT PROCESSING AND DATA PROCESSING FUNCTIONS

VALUE	INSURANCE AGENCIES	MANUFACTURERS ELECTRICAL EQUIPMENT
PERCENT WILLING TO PAY "AT LEAST AS MUCH" AS REPLACED COST	N.A.	29%
AVERAGE PURCHASE PRICE	N.A.	N.A.
AVERAGE MONTHLY COST	N.A.	N.A.
COST SAVINGS		
PERCENT OF CURRENT COSTS	20%	20%
DOLLAR SAVINGS PER MONTH	N.A.	$700
PAYBACK PERIOD	N.A.	1.5 YEARS
PEOPLE SAVINGS	N.A.	N.A.

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- While a number of respondents expressed an interest in System #3, it is obvious they had very little idea how much value it could be to them. (See Exhibit VI-10.) This is probably because the value of facsimile is in improved responsiveness which is difficult to measure.

- System #4 was not of great interest and few respondents could place a value on it. (See Exhibit VI-11.) The easily recognized expenditures for "important" functions associated with System #4 are significantly higher than those of the more popular systems. But the benefits were not easily perceived, and the system was conceptually too complex to be evaluated (especially during the course of an interview).

- The value of the multi-service offerings (Systems #5 and #6) was not quantified by the respondents. This is probably for the following reasons:

  - Expenditures for message and data communication services are based on usage and/or transactions, and rates were not discussed. If comparable services were currently being used, the implication was that a lower rate would be required.

  - Specific data base services were not discussed. Therefore, it was impossible for the respondents to place a value on the service.

- All of the above point out clearly that valuation of new multifunction systems may be difficult. A great deal of discussion and the development of model systems may be required for the small establishment users to evaluate system value with any degree of accuracy. This complicates both product development and marketing.

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D. EVALUATION OF MULTIFUNCTION SYSTEMS

- Users were asked their opinion of potential advantages and disadvantages of multifunction systems (without regard to specific systems' features and functions). The relative importance of these potential advantages is presented in Exhibit VI-12.

  - Cost savings and better responsiveness were rated high by both groups of respondents. Insurance agent respondents rated responsiveness as the most important factor annd manufacturing respondents rated lower cost as being the most important.

  - At the other end of the scale, both groups rated space savings and justification for large storage as being of the least importance.

  - A single vendor relationship was deemed more important by insurance agents. This probably reflects the fact that manufacturing companies are oriented towards dealing with multiple vendors.

  - Fewer operations were viewed as being more important by manufacturing companies. This may result from an industrial engineering approach to the problem, but it also may be because office personnel are spread across departments in the manufacturing companies.

  - Insurance agents rated additional functional capabilities as being more important than did manufacturing companies. This is consistent with the ratings, given functional capabilities on the specific systems.

- The relative importance of potential disadvantages of MFE are presented in Exhibit VI-13.

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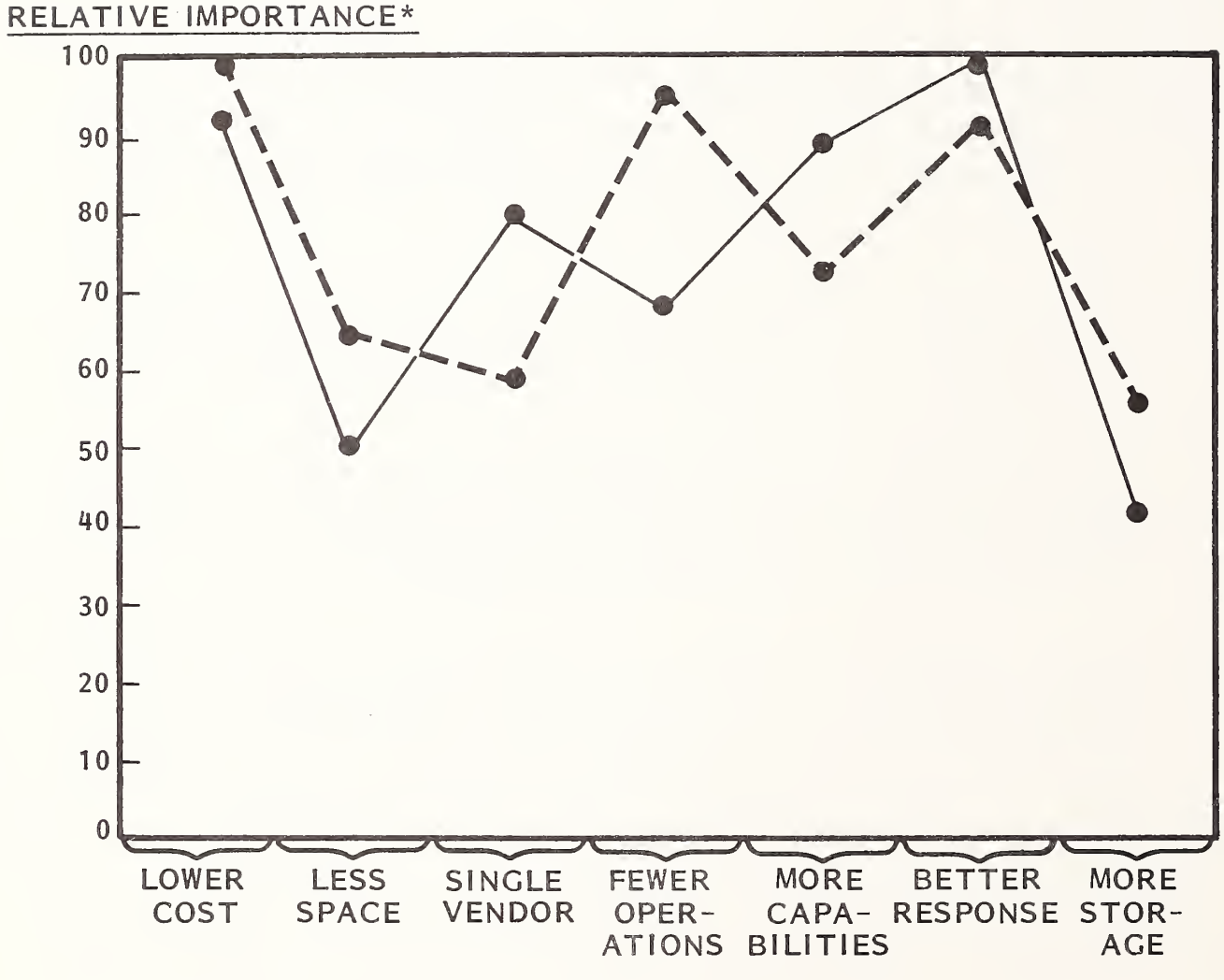
EXHIBIT VI-12

RELATIVE IMPORTANCE OF MFE ADVANTAGES



——— INSURANCE AGENCIES

– – – – MANUFACTURERS ELECTRICAL EQUIPMENT

*MOST IMPORTANT CHARACTERISTIC RATED 100.

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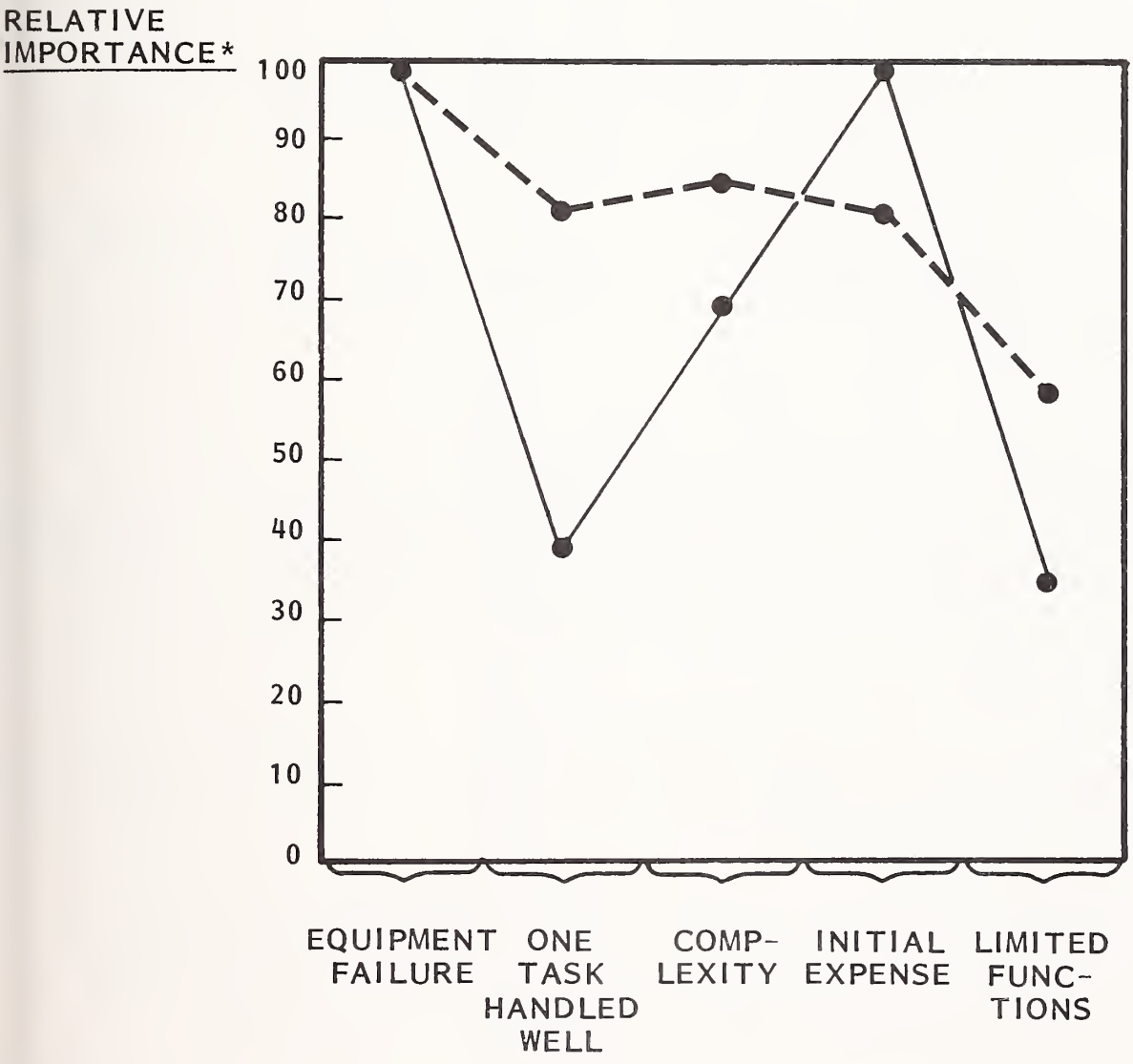
EXHIBIT VI-13

RELATIVE IMPORTANCE OF POTENTIAL
MFE DISADVANTAGES



*MOST IMPORTANT CHARACTERISTIC RATED 100.

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- Both groups agree that the most critical potential disadvantage of MFE is the possibility that the equipment might fail and impact several functions.

- There are sharp differences in the ratings given by the two groups in two of the potential disadvantages. The possibility that "only the primary task may be handled well" and there may be certain "limitations on the number of functions" were both given significantly greater relative importance by manufacturing respondents: 82 vs. 38 and 58 vs. 31 respectively.

- Initial expense was rated of as much importance as potential equipment failure by the insurance agents (100 as opposed to 82 for manufacturing companies).

- Potential complexity was rated of significant importance (85 for manufacturing and 72 for insurance agents). However, even this may be misleading since there seemed to be a general attitude which can best be paraphrased as: "complexity is not a problem - if its complicated we aren't going to buy it."

- At the very end of the interview, users were asked to summarize their general reaction to MFE. (See Exhibit VI-14.)

  - Normally, when a question such as this is asked, interviewees respond about 60% "interested," 20% "enthusiastic," and 20% split among "confused," "doubtful," and "who needs it." Only deviations from this pattern are considered of any significance.

  - Manufacturing respondents fit the standard pattern almost exactly.

  - Insurance agent respondents demonstrated a high positive reaction to MFE with 43% reporting enthusiasm and only 10% falling into the three negative categories.

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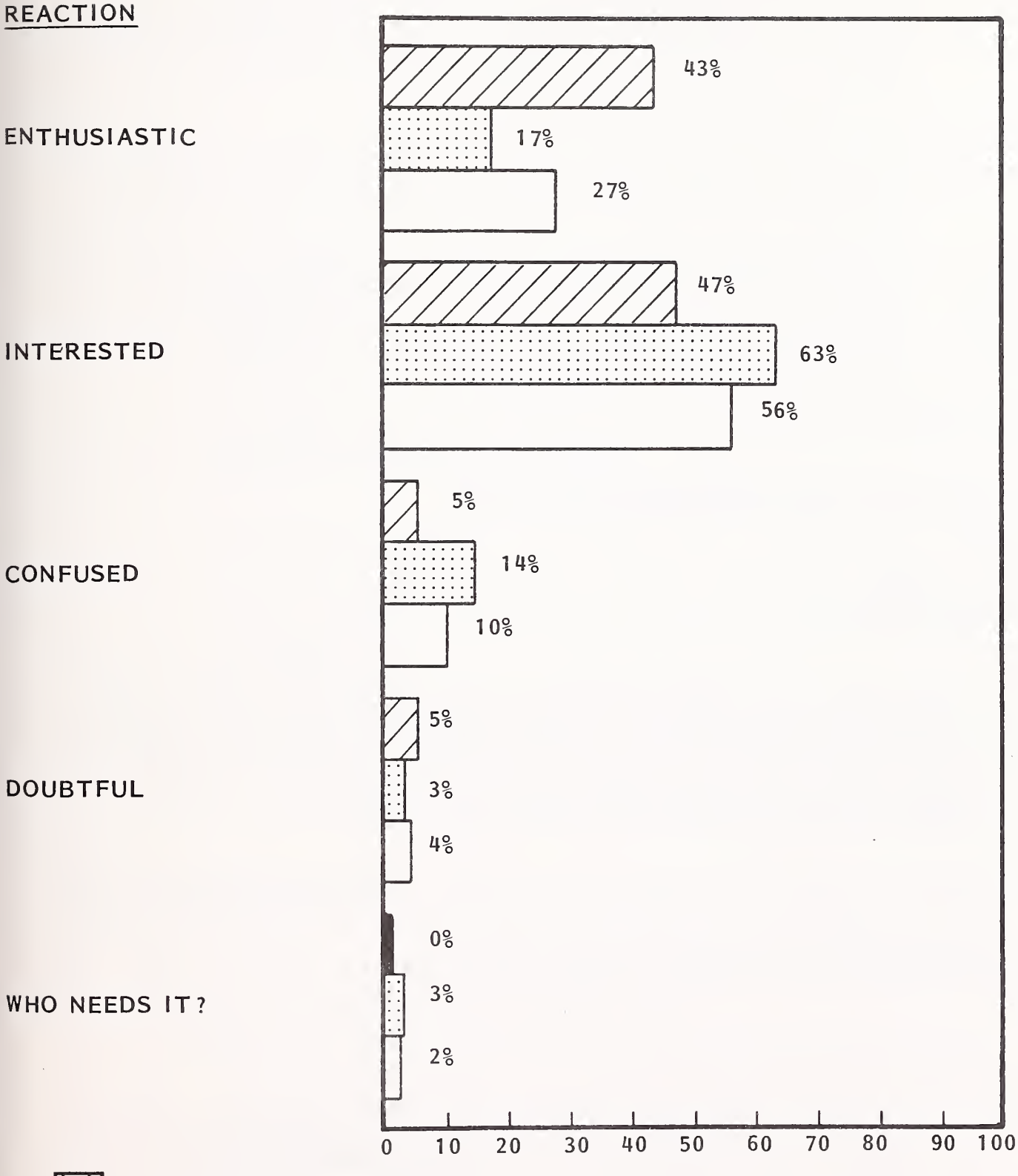
EXHIBIT VI-14

GENERAL REACTION TO MFE



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- Thus, the multifunction systems which were defined have great appeal in office oriented organizaitons where the primary "product" is paper. Whether the product is insurance policies, legal documents, correspondence, research reports, or advertising copy is probably immaterial. MFE is the key to office automation.

- Manufacturing companies must give top priority to operational problems annd management cannot be expected to get enthusiastic about improving "paperwork" which is essentially considered a necessary evil. However, all businesses require office operations and whether money is spent enthusiastically or reluctantly does not decrease the potential market size.

E. WHAT ARE THE POTENTIAL EXPENDITURES

1. THE PROBLEM

- It was stated at the beginning that practically an infinite variety of multifunction equipment and services could be designed. The six systems defined were presented as being representative of logical combinations addressing the general area of office automation in small enterprises.

- Potential users of the systems had difficulty defining the value of these systems and that is understandable because the systems are new and undefined and the users did not have the time to study them.

- The failure to analyze systems value occurred primarily in two areas:

  - The general feeling that certain expenses either could not or should not be cut. A good example of this is voice communciations which was the largest single identifiable expense but for which multifunction system design generated only limited interest.

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- The general area of personnel expenses associated with voice communications, copiers, and (to a certain degree) word processing. Most interviewees could not quantify the value of improved employee productivity or responsiveness.

- Two on-site interviewees had quite a different perspective on voice communications expenses which is lost in the statistical presentation of the results.

  - The financial vice president of a manufacturing company which had recently installed a PABX stated: "We justified the system based on savings in service cost and a few goodies, but the really important savings can be in people costs - not just secretaries but executives." (It is estimated that salaries for time spent on the phone is approximately seven times the charge for service.)

  - A financial consultant for three small manufacturing companies commented: "Until recently I thought only large companies could justify a PABX, now I'm convinced one can be justified with three or four lines."

- One interviewee when asked about his copying expense, speculated "the machine expense isn't too much, but the paper cost is high, and I'll bet personnel time costs more than both of them combined." (He was right.)

2. LEASE VS. PURCHASE

- With new systems of obvious value available, would customers prefer to lease or purchase? Exhibit VI-15 shows the following:

  - Manufacturing companies would prefer to lease System #1 (75% lease - 25% purchase) whereas insurance agents have mixed emotions (47% lease - 53% purchase).

  - Lease of System #2 is favored by 80% of all respondents.

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EXHIBIT VI-15

LEASE VS. PURCHASE PREFERENCE
BY SYSTEM

SYSTEM TYPE	PREFER LEASE	PREFER PURCHASE
SYSTEM #1		
INSURANCE AGENCIES	47%	53%
MANUFACTURERS	75	25
COMBINED	60	40
SYSTEM #2		
INSURANCE AGENCIES	100	0
MANUFACTURERS	71	29
COMBINED	80	20
SYSTEM #3		
INSURANCE AGENCIES	50	50
MANUFACTURERS	37	63
COMBINED	42	58
SYSTEM #4		
INSURANCE AGENCIES	N.A.	N.A.
MANUFACTURERS	100	0
COMBINED	N.A.	N.A.

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- System #3 is the only one where a preference for purchase is expressed (58% purchase - 42% lease).

F. USER REACTIONS ABOUT MFE FROM DIFFERENT INDUSTRY SECTORS

- During the analysis and field research for the small establishment service (SES) in 1978, INPUT asked respondents from other industry sectors what their attitude was toward multifunction equipment. In those interviews multifunction equipment was not defined into the six classes of equipment/services treated in this report. However, the attitudes of the respondents towards multifunction equipment are similar to those in this analysis and lend increased statistical weight to the conclusions.

  These additional sectors are:

  - Discrete manufacturing, Exhibits V-16 to V-19 (from the SES Industry Report #1).

  - Accounting, Exhibits V-20 to V-21 (from the SES Industry Report #2).

  - Banking, Exhibits V-22 to V-25 (from the SES Industry Report #3).

- The questions asked of the respondents were:

  - "Would a piece of office equipment that can accommodate several administrative functions be more attractive to you than single function equipment?"

  - "Which administrative functions would it have to handle?"

- The comments quoted in the exhibits are answers to the open-ended questions and show that respondents perceive MFE as a way to combine solutions to

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EXHIBIT VI-16

DISCRETE MANUFACTURING - WOULD MULTIFUNCTION EQUIPMENT BE DESIRABLE?

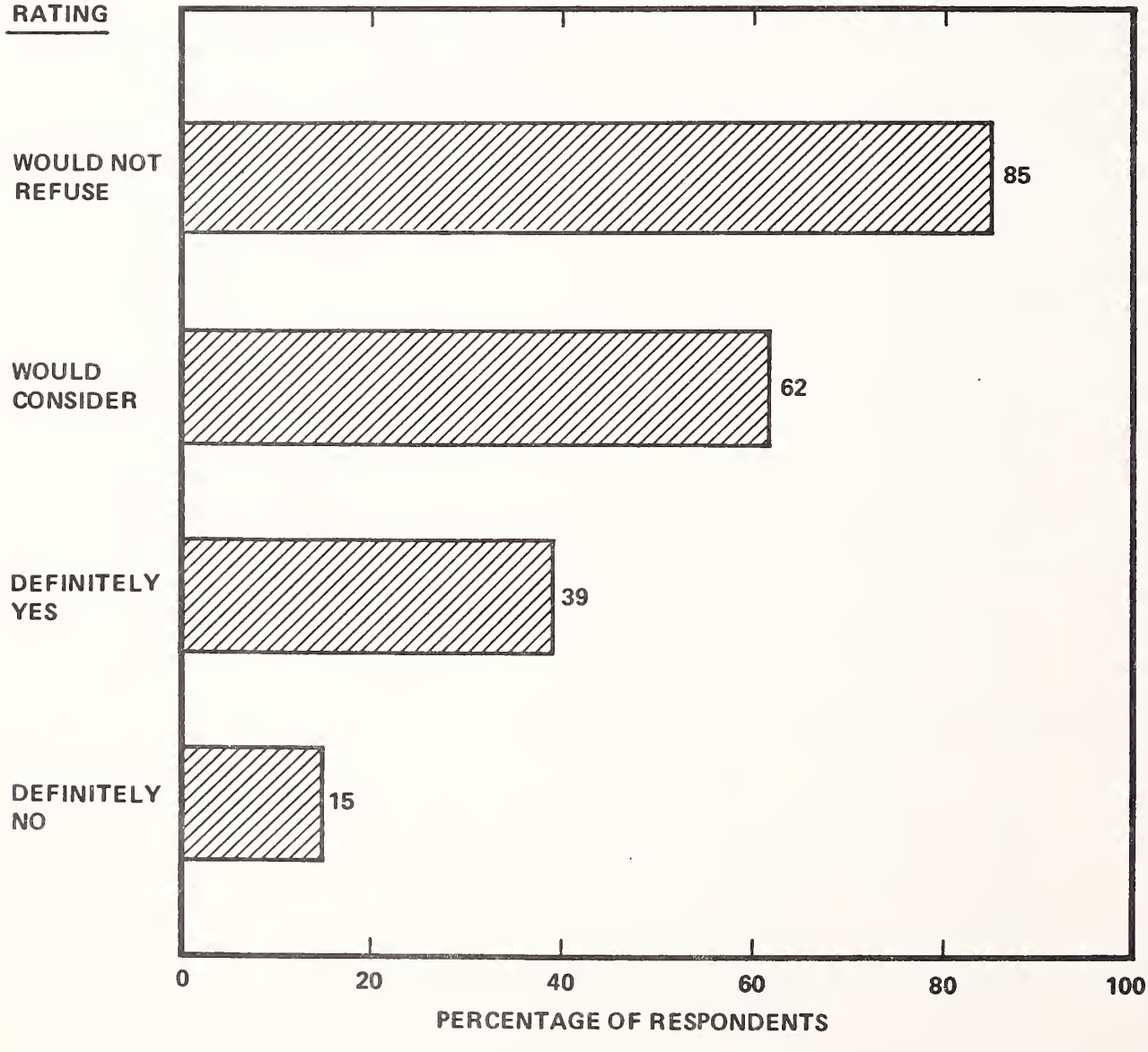

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EXHIBIT VI-17

DISCRETE MANUFACTURING - ATTRACTIVENESS
OF MULTIFUNCTION EQUIPMENT
(BY SIZE OF ESTABLISHMENT)

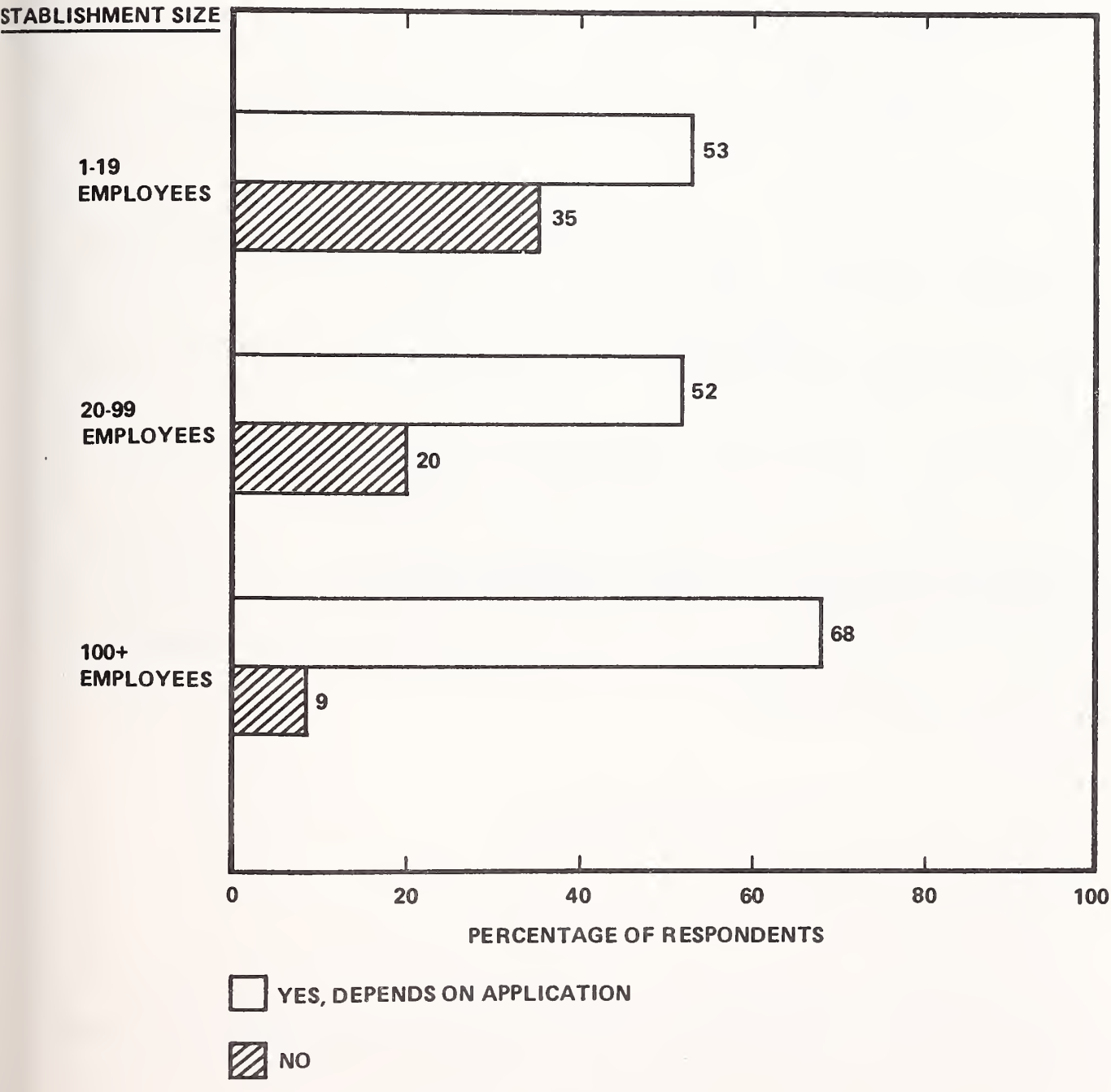

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EXHIBIT VI-18

DISCRETE MANUFACTURING - DESIRABLE FEATURES
FOR MULTIFUNCTION EQUIPMENT

- "COMMUNICATING WORD PROCESSOR WITH PROFESSIONAL-LOOKING OUTPUT"
- "DIRECT ACCESS TO MASTER COMPUTER WITH PRINT-OUT FEATURE"
- "TERMINAL AND TEXT PROCESSOR"
- "HANDLE SECRETARIAL AND ADMINISTRATIVE FUNCTIONS"
- "WOULD DEPEND ON COMBINATION OF COST AND CONVENIENCE"
- "FOR DATA-ENTRY AND WORD PROCESSING"
- "TO DO EVERYTHING FROM INVOICING THRU A/R, A/P, INVENTORY CONTROL, REPORTS, SALES AND PURCHASE ANALYSIS, GENERAL LEDGER, P & L"
- "TYPEWRITER-TYPE TERMINAL FOR PROGRAMMING, TYPING, FORMS PRINTING AND COMPLETION"
- "CURRENTLY LOOKING FOR SOMETHING TO HANDLE ALL FUNCTIONS"
- "WILL LOOK INTO IT, DIDN'T KNOW SUCH A THING EXISTED"
- "LABOR REPORTING, MATERIAL RECEIVED AND ISSUED, DRAWING FILE ACCESS, PRODUCTION SCHEDULING, PAYROLL"
- "PARTS EXPLOSION, INVENTORY CONTROL, A/P, A/R, ORDER WRITING"
- "PRODUCTION CONTROL"
- "ESTIMATING"
- "MARKETING-CONTRACTS-ACCOUNTING"
- "AS MANY AS POSSIBLE"
- "EXPANDABLE AS THE COMPANY EXPANDS"
- "WE ARE GOING FOR THE ELECTRONIC OFFICE"

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EXHIBIT VI-19

DISCRETE MANUFACTURING - PERCEIVED DRAWBACKS TO MULTIFUNCTION EQUIPMENT

- "NOT NEEDED HERE, HAVE AT CORPORATE HEADQUATERS"
- "MANY CLAIMS FOR EXTRA FUNCTIONS ARE ONLY USED ONCE A YEAR OR LESS"
- "ONLY ACCOUNTING IS DONE HERE"
- "CAN'T THINK OF ANY APPLICATIONS"
- "DON'T FEEL IT IS NEEDED, CASSETTE CAPACITY IS TOO SMALL FOR THE NUMBER OF PARTS WE HAVE IN INVENTORY"
- "NO NEED"
- "NOW HAVE COMBINATION SYSTEMS"
- "NO REAL PROBLEMS"
- "ONLY NEED IS FOR MARKETING AND ACCOUNTING - BIGGER MACHINE IS A WASTE OF TIME AND MONEY"

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EXHIBIT VI-20

ACCOUNTING -
HOW MANY RESPONDENTS WOULD CONSIDER
USING MULTIFUNCTION EQUIPMENT?
(BY SIZE OF ESTABLISHMENT)

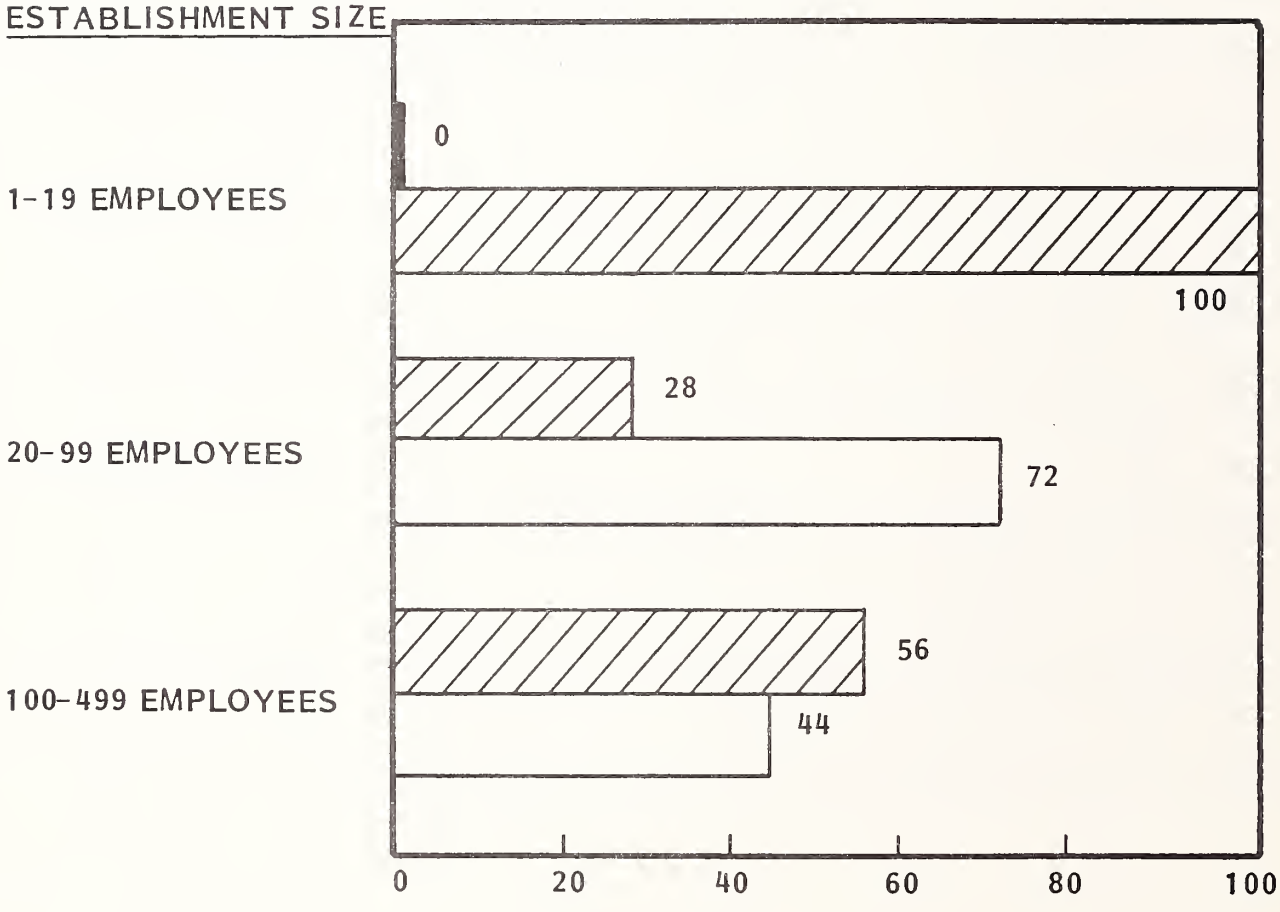

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EXHIBIT VI-21

ACCOUNTING - DESIRABLE FEATURES FOR MULTIFUNCTION EQUIPMENT

- "Accounting and computing."
- "Communications, word processing, and light computing."
- "Word processing and computing."
- "Handle multi-station word processing and transfer information off files."
- "Communications (in place of telex equipment) and word processing."
- "Word processing and computing with terminal capabilities."
- "Word processing and some number capabilities."
- "Word processing and calculating/computing."

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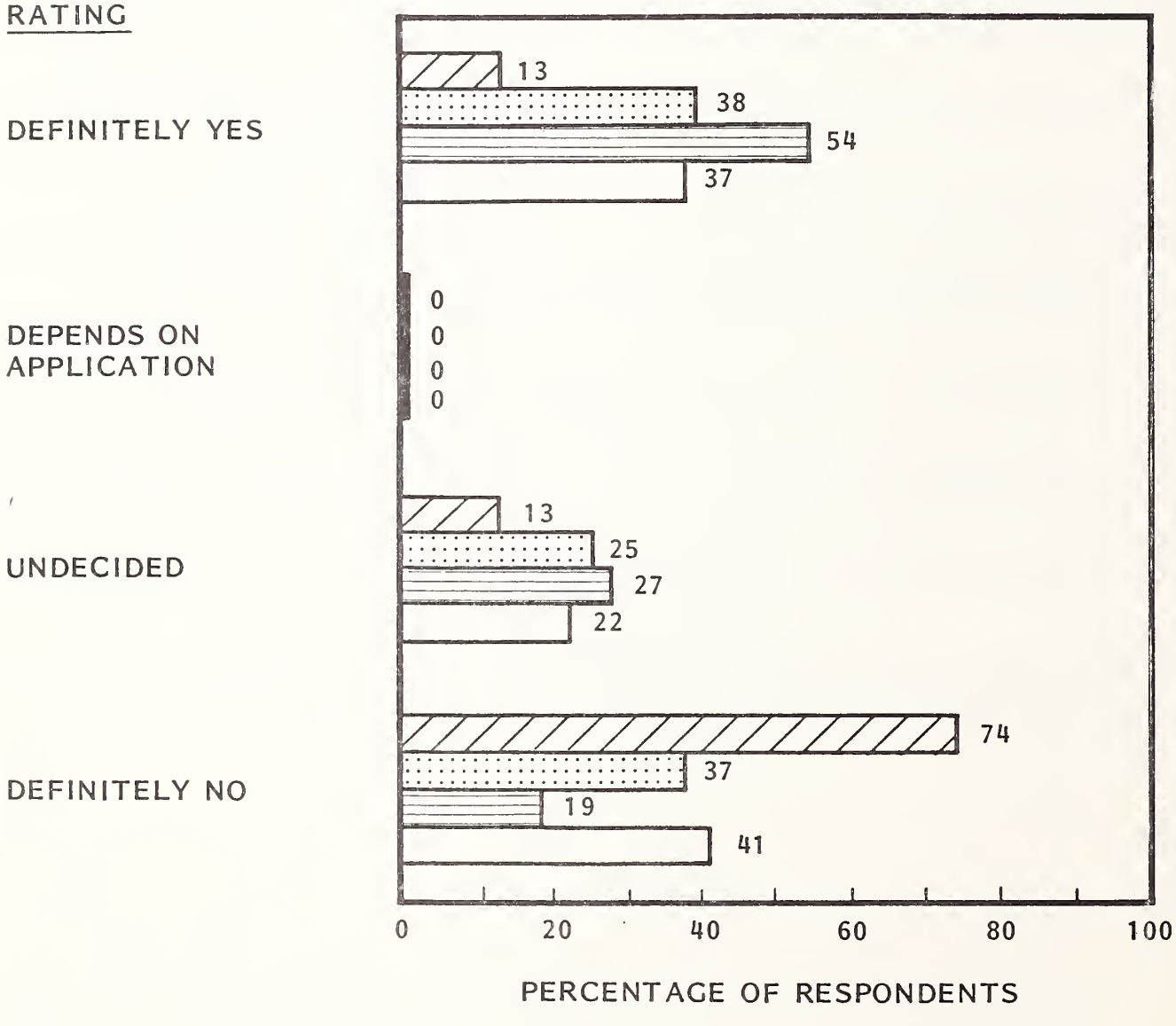
EXHIBIT VI-22

BANKING
WOULD MULTIFUNCTION EQUIPMENT BE DESIRABLE?
(INDEPENDENTS)



1-19 EMPLOYEES (N = 8)
20-99 EMPLOYEES (N = 8)
100-499 EMPLOYEES (N = 11)
COMBINED (N = 27)

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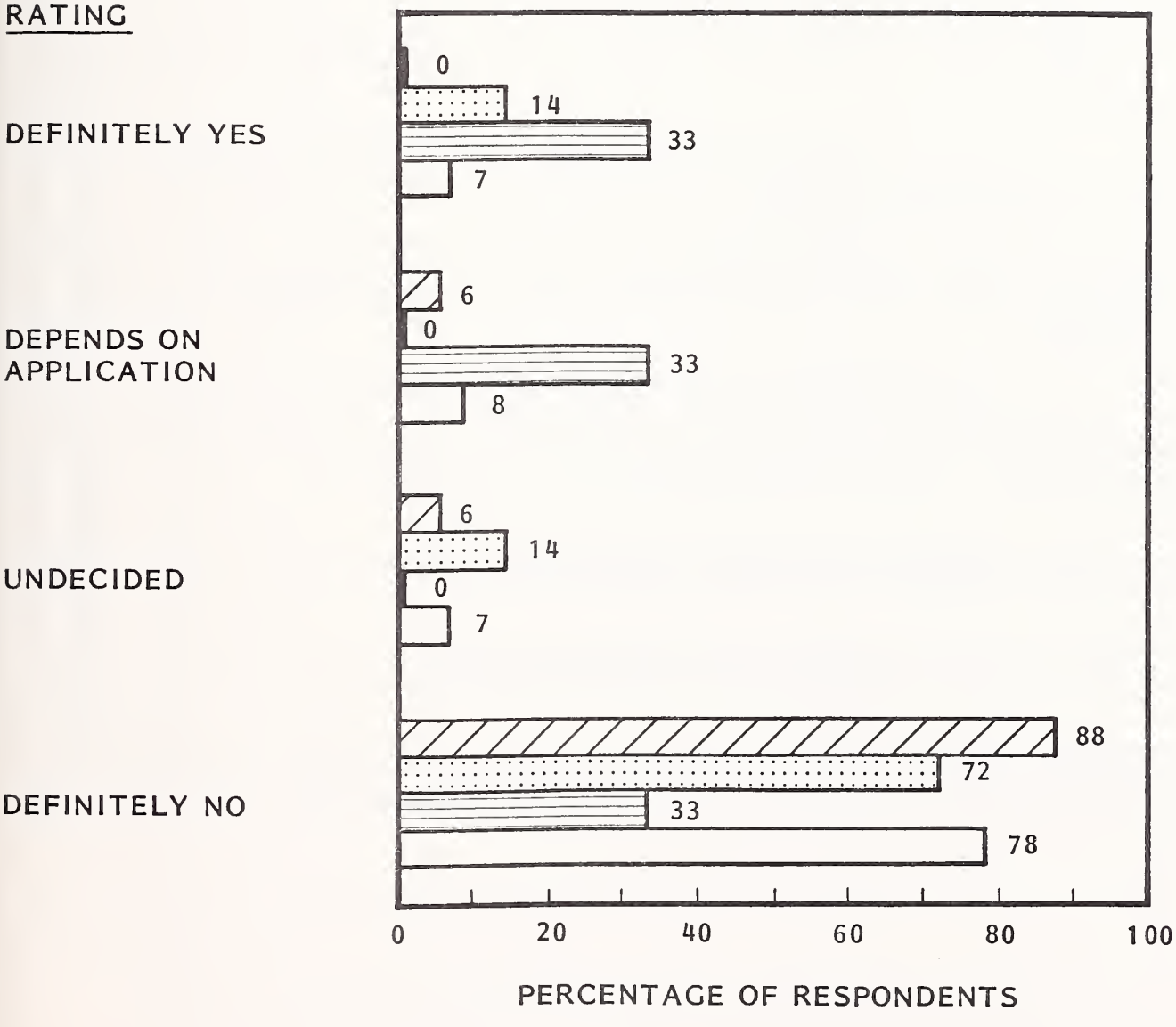
EXHIBIT VI-23

BANKING -
WOULD MULTIFUNCTION EQUIPMENT BE DESIRABLE?
(BRANCHES)



1-19 EMPLOYEES (N = 17)
20-99 EMPLOYEES (N = 7)
100-499 EMPLOYEES (N = 3)
COMBINED (N = 27)

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EXHIBIT VI-24

BANKING -
DESIRABLE FEATURES FOR
MULTIFUNCTION EQUIPMENT

- "Would be nice to combine word processing and data processing."
- "Currently have a sophisticated data processing/communications interface system."
- "Want to eventually incorporate all functions onto an in-house computer."
- "Will soon have word processing/communications ability through a central computer."
- "In a large operation, you need an interlocking of communications and data processing."
- "Will put almost all clerical duties on computer."
- "Teller machines and light typing through computer."
- "Currently using an on-line audio response, and may put in word processing."

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EXHIBIT VI-25

BANKING -
PERCEIVED DRAWBACKS TO MULTIFUNCTION EQUIPMENT

INCREASING SIZE OF RESPONDENT ESTABLISHMENT

- "No need."
- "Too small to purchase any equipment."
- "Headquarters wouldn't consider anything so advanced for such a small branch."
- "Buying own equipment would be too expensive."
- "No need for more than the basic equipment."
- "Needs at this level are too small to justify costs."
- "Never heard of multifunction equipment."
- "Needs for this diversity are not strong enough at branches to warrant cost."
- "We're lucky to have an electric typewriter."
- "Not interested in multifunction equipment."

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many problems in one piece of equipment. This is especially true of text and data equipment. This attitude toward MFE exists in all industry areas.

- The response to MFE in all sectors reported upon is mostly positive.

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VII MARKET ANALYSIS AND REQUIREMENTS

VII MARKET ANALYSIS AND REQUIREMENTS

A. TOTAL MARKET SIZE AND COMPETITIVE ENVIRONMENT

- The employees in small establishments represent approximately 70% of the total work force in the United States.

- In 1977, a total of $31.3 billion was spent by small establishments for information processing equipmment and services. (Computer equipment, computer services, office equipment, communications equipment, and communications services). This represented 44% of total expenditures for such equipmment and services.

- In order to maintain growth, companies engaged in the marketing of information processing equipment and services view the enormous expenditures for information processing related functions to be a primary target for automation.

- The 1977 expenditures for equipment and services of $31.3 billion is already a major competitive arena in which various vendors see an opportunity to: combine functions, improve value to customers, and grow at the expense of a competitive product or service. Obvious examples include:

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- Computer and office equipment manufacturers seeking to establish communications networks. (Satellite Business Systems and Xerox Telecommunications Network being examples.)

- Computer services companies providing value added network functions. (Tymshare/Tymnet.)

- Computer services companies providing computer hardware. (ADP, NCSS, GE, and numerous others.)

- The small business/word processing competition as represented by System #1 and System #2 which has numerous competitors.

- The integration of voice, data processing, and data communications products and services.

- There is a definite feeling that if you don't expand into the other guys market area he will sooner or later expand into yours. In addition, the battle is for more than market share in the existing environment. It is for position in the overall market of office automation and distributed processing - an area in which tremendous growth is anticipated.

- It should be clearly understood that the growth in this market area must be supported primarily by improved employee productivity or, to put it another way, in reduced personnel costs. Significant growth cannot be supported by merely replacing existing hardware or services with no increase in functions.

- Under any circumstances, the potential small establishment market is enormous, and competition will increase even beyond its current level.

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B. GENERAL MARKETING REQUIREMENTS FOR MFE IN SMALL ESTABLISHMENTS

- In order to penetrate this potentially attractive market, it is necessary to understand certain general characteristics and attitudes of small establishments.

  - In the insurance agencies interviewed, 88% did not have anyone designated as an EDP manager, and 94% did not have anyone designated as a manager of communications. (See Exhibit VII-1.)

  - In the manufacturing establishments, 54% did not have an EDP manager and 100% did not have a designated manager of communications. (See Exhibit VII-2.)

  - Top management will practically always be involved early in the decision making process (88% and 90% respectively) and will always make the final decisions.

  - When small establishments have controller's, they will always be directly involved in the evaluation of information processing products and services. However, they do not necessarily participate in the final decision making process. (6% in non-manufacturing and 50% in manufacturing.)

  - Office managers will usually be involved if the company has one but will seldom participate in the final decision making process.

  - Therefore, non-technical personnel will be responsible for evaluation, selecting, and (in most cases) installing MFE systems.

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EXHIBIT VII-1

INSURANCE AGENCIES ORGANIZATIONAL RESPONSIBILITIES
FOR PURCHASE DECISIONS

POSITION	DON'T HAVE	NOT INVOLVED	INVOLVED	FINAL DECISIONS
TOP MANAGEMENT	0%	0%	88%	100%
CONTROLLER	56	0	44 (100%)	6
OFFICE MANAGER	25	25	50 (100%)	0
EDP MANAGER	88	6	6 (50%)	0
COMMUNICATIONS MANAGER	94%	0%	6% (100%)	0%

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EXHIBIT VII-2

MANUFACTURING ORGANIZATIONAL RESPONSIBILITIES
FOR PURCHASE DECISIONS

POSITION	DON'T HAVE	NOT INVOLVED	INVOLVED	FINAL DECISIONS
TOP MANAGEMENT	0%	0%	90%	100%
CONTROLLER	0	0	100	50
OFFICE MANAGER	50	13	37 (75%)	13
EDP MANAGER	54	0	46 (100%)	0
COMMUNICATIONS MANAGER	100%	0%	0%	0%

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- Fascination with technology is absent. In fact, there is general suspicion and antipathy towards computer-oriented personnel and elegant systems solutions.

- There is a practically universal feeling that, while there are many products and services, few specific (and affordable) solutions are being offered to small establishment problems.

- Since operating personnel must be involved in product evaluation and system implementation, any time taken to consider or install new systems will directly impact the primary functions of the organization.

- While top management makes the decision to install a system, they do not become personally committed to make it work as DP managers do in large organizaitons. If installation doesn't go smoothly, top management is inclined to throw the system out. After all, their job isn't on the line, and they are keenly sensitive to impact on the organizations day-to-day business.

- In other words, the innate small establishment flexibility in the selection process can also be exercised in later rejection of systems which are deemed unsatisfactory.

- Small establishments feel they have unique problems and perhaps they do. There is an infinite variety in terms of product, function, organization, and resources. In addition, they frequently are more "personal" in nature. The solution must fit the specific characteristics of the personnel.

- It is possible to conclude that small establishment management will select and acquire what they want and need. The product or service must be easily related to understood problems, and education on the system must be brief. A simple demonstration is frequently all that time will permit in a sales situation.

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- Top management is in a position to evaluate the success of the system. Failures to meet commitments in terms of savings and responsiveness will be readily apparent.

- During the interviews, a question was asked concerning the difficulty or complexity of marketing MFE in small establishments. (See Exhibit VII-3.)

  - Thirty-four percent of all respondents felt the marketing of MFE would be "extremely complex."

  - Forty-one percent felt it would be "difficult."

  - Fifteen percent felt it would be "somewhat difficult."

  - Two percent felt it would be "easy."

  - Seven percent felt it would be "very easy - if."

  - It is obvious that small establishment businessmen do not feel they are an easy mark for advanced technology, and their responses support the attitudes and characteristics of small business establishments listed above.

- Exhibit VII-4 presents some quotes from the insurance agencies interviews which add some flavor to the characteristics and attitudes of small establishments. Exhibit VII-5 quotes manufacturing interviewees. Both are characterized as having needs which must be met, but being suspicious of vendors and salesmen offering solutions.

- Perhaps the best characterization of independent small establishments attitude was obtained in an unrelated study of distributed processing. The senior vice president of a small manufacturing company stated: "Nobody is going to take care of us but us!"

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EXHIBIT VII-3

COMPLEXITY OR DIFFICULTY OF MARKETING MFE

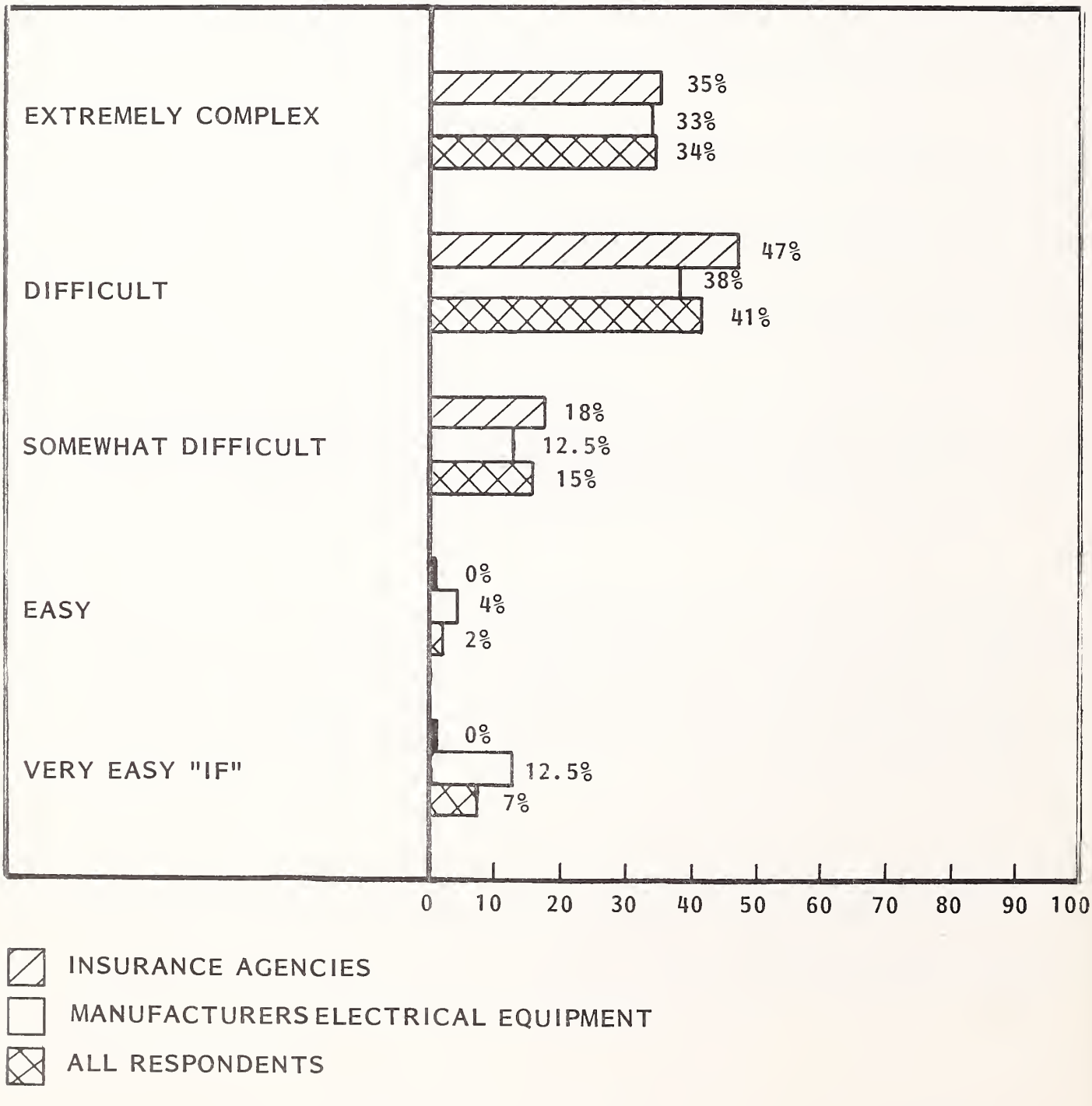

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EXHIBIT VII-4

INTERVIEW COMMENTS WHICH CHARACTERIZE
SMALL ESTABLISHMENT ATTITUDES - INSURANCE AGENCIES

- "The vendors should understand the problems and tailor the solutions."
- "It is difficult to get people to change - initial expense will be used as an excuse for lethargy."
- "They (major insurance vendors) don't understand our problems, and they don't understand their own systems. We need something, but it isn't coming soon. In the meantime, we have to make do."
- "I don't think regular computer services companies really understand the problems or could solve them."
- "The paperwork is very bad; something must be done."
- "I don't trust any salesman right now. After getting burned I have a real 'show me' attitude. Bring your machine in here and show me what it will do and what it won't do."
- "Just show me how much money I can save."
- "I want a computer to do my paperwork so I can sell insurance."
- "A hardware salesman must know about the application. Don't just go in and sell a 'do it all' box."
- "A file clerk cannot run one of these machines as they seem to think."

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EXHIBIT VII-4 (contd)

INTERVIEW COMMENTS WHICH CHARACTERIZE SMALL ESTABLISHMENT ATTITUDES - INSURANCE AGENCIES

- "Despite the problems, it (a minicomputer) has done wonders for us."
- "I am interested in anything that will save me money." (Notice the personal involvement.)
- "I would have considered a mini a year ago, but after seeing the experience of my friends I'm much more wary now."
- "I like the batch system. I'm not looking forward to the on-site responsibilities. I'm concerned about finding somebody competent to run it."
- "I want the system to be a simplifier. I don't want anything exotic."
- "I want to supplement my people not replace them." (Again a personal note with marketing ramifications.)
- "I see a lot of misuse of computer technology. Without solid, integrated operating systems it can be a monstrous thing of no practical value."
- "It should never become a replacement for people in a service oriented company."
- "When things were going bad, the president wanted to throw it out."

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EXHIBIT VII-5

INTERVIEW COMMENTS WHICH CHARACTERIZE SMALL ESTABLISHMENT ATTITUDES - MANUFACTURING

- "Corporate type of approach - must have ability to communicate requirements. Some of these things are interesting, but you must have a plan. I have to solve specific problems - can't wait for a plan."
- "In order for any MFE to be accepted, it must be truly modular."
- "The sum of the hardware costs may be less with integrated systems, but the sum of complexity (implementation expense) may be greater."
- "I'm dominated by three partners in a private corporation - it all has to be totally justified."
- "Everything that you are talking about is potentially available as technology currently exists. It needs to be made cost effective."
- "The actual sale will be easy because there is a need - explaining all the possibilities will be the hard part."
- "I would like to see a clear explanation from a bookkeeping point of view as to what the system is designed to do. I don't want another book written by mathematical geniuses for mathematical geniuses."
- "We are their largest account and their guinea pig." (Comment concerning a major computer services company.)
- "They (vendors) want to suck you in and keep you from having flexibility."

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EXHIBIT VII-5 (contd)

INTERVIEW COMMENTS WHICH CHARACTERIZE SMALL ESTABLISHMENT ATTITUDES - MANUFACTURING

- "I don't want a vendor to show me one thing and then install it and have the salesman say: 'Now for only $4K more you can get the feature that was on the demo machine."

- "Consider our needs and priorities."

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- Most of the attitudes of small establishments identified in this study coincide with those which were detailed in "Distribution Channels for Information Processing Equipment and Services to Small Establishments," Impact Report #1, INPUT, June 1978.

  - The equipment or service must perform the proper functions.

  - It must be reliable.

  - Users are concerned about vendor responsiveness.

  - Users do not trust vendors.

  - Users do not have very much time to spend in analysis.

- Perhaps because MFE was a new concept to many of the interviewees, and some viewed the systems as being complicated, there was a subtle change in the above attitudes.

  - There was increased concern about vendors not understanding the users specific problems.

  - As a result, the requirements expressed were that the system or service be tailored to the users specific problems. (As opposed to performing the proper function.)

  - It is probable that MFE was viewed as being another attempt to solve all of the world's problems with a single system.

- In addition, two additional factors assumed great importance for many users:

  - The system should be modular so one function can be implemented at a time. This requirement is important in terms of initial investment of both money and personnel. Many small companies have multifunctional

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employees - it is impossible to implement several major functions at the same time.

- It is important that multiple functions can be performed simultaneously. For example, one office manager was especially concerned because she was sure that accounting functions and word processing would cause conflict in the office.

- Both of the above requirements are obviously aimed at potential problems inherent in MFE.

- Therefore, for multifunction systems or services to be acceptable in the small establishment marketplace, it ideally should have the following characteristics:

  - Have applications support tailored to the individual user's requirements.

  - Be easily understood, since they may be installed and operated by non-EDP personnel.

  - Be of modular construction so individual functions can be phased in and paid for as they become operational.

  - Be reliable, and the vendor must have established credibility for maintenance and service.

  - Have demonstrable advantages in terms of cost savings and/or employee productivity (responsiveness).

  - Have multiprogramming or multiprocessing capability to support simultaneous functions.

  - Be packaged such that all of the above will be apparent to the chief executive of the establishment in a relatively brief sales meeting.

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- Even if all of the above are present in the system or service, market coverage can still be a problem. The problems of reaching the small establishment market was thoroughly covered in Impact Report #1 on distribution channels, and the alternatives covered in that report should be understood.

C. ANALYSIS OF MARKET REQUIREMENTS BY SYSTEM

- It is assumed that the general market requirements for MFE apply to all systems. However, the importance of some of the general requirements may vary from system to system. The most important requirements will be those which apply to the primary function, and then those which apply to the added functions considered most important by the respondents. (It is assumed necessary hardware features will be incorporated into the system.) This section will explore briefly the most important requirements for each system.

- System #1 (small business computer with add on text functions) generated the most interest of any system and attests to the importance small establishments place on data processing functions.

  - Therefore, the most important requirement is for easy to use, applications systems which are tailored to the specific user set. Ideally, data elements, display and report formats, and educational materials should be in terms which are familiar to the end user.

  - Cost justification for systems can be specifically identified with improved personnel effectiveness in both clerical and professional ranks through improved communications functions (correspondence, reports, and communications expenses). It is probable that cost savings are important for secondary functions and not on the primary function.

  - Education in the potential savings on voice communications is especially important since this potential benefit was largely ignored.

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- Simultaneously, support of multiple functions is especially important in this environment since it is apparent that data processing would coexist with text processing during normal working hours.

- System #2 (text editing system with add on communications functions) was not very well received in this particular study, but that was probably due to the nature of the sample. Establishments where the produciton of technical documents is of primary importance (law offices, research firms, etc.) should find text processing systems an attractive primary building block for a multifunction system.

  - The system should be oriented towards more effective use of both clerical and professional personnel. The system should support casual use by professional personnel (as opposed to operators who would be trained in detailed functions) for purposes of document retrieval, review, and correction.

- System #3, (copier performing facsimile and output printer functions) is based on an office copier which is familiar to everyone and everyone is therefore a systems designer.

  - The most important requirement is to demonstrate reliability and have established credibility for maintenance and service. Convenience items have a way of becoming necessities, and as vital communication functions are integrated, failure could become critical.

  - Personnel costs of copying are substantial (considering professional use in addition to clerical time) careful systems design could make System #3 cost effective also.

- System #4 (PABX with add on functions of computation and text processing) generated the least interest of any system and it did not seem that it was merely because it was not considered a good primary building block by users (there was a vendor bias).

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- The primary requirement is for clearly demonstrable advantages in terms of cost savings and/or employee productivity.

- The second requirement is to package the system so that management will be able to recognize the cost savings and/or improved productivity.

- In other words, marketing is the most important problem with the system.

- The secondary functions must be easily understood (and appreciated) since they will be available to practically all office personnel.

- System #5 (communications network with add on information processing functions) generated substantial interest among independent insurance agents who have a specific need - they must communicate with multiple organizations. As was pointed out, this requirement exists for many small establishments.

  - Reliability, maintenance, and service are the most important factors in the marketplace, and here image can be important.

  - The underlying communication functions must be as economical as they would be with other communications services (leased line, regular switched networking, private network, etc.)

  - The operational aspects of the secondary functions must be clearly understood so they can be easily exercised by casual users (in other words, complex logic must not be required to extract or analyze data).

  - Last, but not least, regulatory approval is an essential requirement to market entry.

- System #6 (timesharing with add on communications functions) also generated considerable interest on the part of independent insurance agents because of

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recognized communications problems. In fact, the degree of interest was comparable to that of System #5 (65% vs. 59%), and seems to indicate combined computer/communications services are desirable on either basis.

- Reliability, maintenance, and service are also important factors for computer services companies. In fact, it is even more important than for communications services companies. The reliability of communications services is generally conceded to be superior to computer operations. As multifunction services are provided, the reputation of the primary function will initially prevail.

- The primary requirement is for clearly demonstrable savings in terms of function and personnel. In other words, it is cheaper (or more convenient) to do my data processing with a service company than it is to have an in-house system.

- The secondary service of intra- and inter-company electronic message (electronic mail) services requires economic or convenience justification also.

- And of course regulatory approval is essential.

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APPENDIX A: INTERVIEW PROGRAM FOR THE STUDY MULTIFUNCTION EQUIPMENT IN SMALL ESTABLISHMENTS

APPENDIX A

INTERVIEW PROGRAM FOR THE STUDY, MULTIFUNCTION EQUIPMENT IN SMALL ESTABLISHMENTS

INTERVIEW TYPE	MANUFACTURING OF ELECTRICAL EQUIPMENT	INSURANCE BROKERS	VENDORS OF EQUIPMENT AND SERVICES
ON-SITE	6	6	--
TELEPHONE	18	12	13
TOTAL	24	18	13

	RESPONSES
DATA FROM SECRETARIAL WORK HABITS SURVEY	
DATA FROM ADDITIONAL INPUT REPORTS (SES) IN 1978	30

REPORT	RESPONSES
DISCRETE MANUFACTURING	110
ACCOUNTING	54
BANKING	54
TOTAL	218

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APPENDIX B: DEFINITIONS

APPENDIX B: DEFINITIONS

- An enterprise is a business organization.

- An establishment is a physical location, or a street address and can be:

  - An independent enterprise.

  - A branch of a major enterprise.

- An establishment can be a single-unit enterprise (SUE) or part of a multi-unit enterprise (MUE).

  - A single unit enterprise is an establishment having all operations consisting of activities not distinctly separable.

  - A multi-unit enterprise is a business organization consisting of more than one establishment or an establishment having distinctly separable activities.

- A branch is a physical location or street address and part of a "Big Eight" accounting firm or other national accounting firm.

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- An independent establishment is a SUE or MUE whose employment is 500 employees or less, and which is not a branch as defined above.

- Computer services are provided by vendors which perform data processing functions using vendor computers, or who assist users to perform such functions on their own computers; included are remote computing services (RCS), batch services, facilities management, professional services, and software products.

- Computer equipment includes any locally installed terminal, minicomputer, or mainframe. For the purpose of forecasting only, the term is defined as locally installed general purpose minicomputer or mainframe; i.e., local processing intelligence -- not including desk top calculators or accounting machines.

- Communications equipment includes keyset or PABX. Communications automation is defined as interconnect, which is the attachment and use of non-telephone company equipment together with telephone company equipment or services.

- Communications services includes direct dial long distance (DDD), WATS, leased lines, tie lines, Telex/TWX, or other regulated transmission of voice or data.

- Office automation is defined as the use of word processing/text editing equipment, either single station or multi-station.

- Office equipment includes word processing, photocopiers, duplication machines and facsimile equipment.

- Industry specific EDP applications are defined as EDP applications which are important automatable functions of an industry or group of industries; e.g., interline payables (transportation) and bill of materials (discrete manufacturing).

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APPENDIX C: QUESTIONNAIRES

APPENDIX C: QUESTIONNAIRES

- Copies of the questionnaires used during the field research are included in this appendix. They are:
  - Users On-Site.
  - Users Telephone.
  - Equipment and Service Vendors.

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CATALOG NO. S M F E ☐ ☐ ☐

USER QUESTIONNAIRE (ON-SITE)

1. How do you currently handle your requirements for the following? And how much does it cost?

Satisfied Dissatisfied

	In-house (Type)	Service Bureau (Which)	Manual (People)	Cost* ($ Per Mo.)
Data Processing ☐ ☐				
Text (Word) Processing ☐ ☐				
Copying ☐ ☐				
Voice Communications ☐ ☐				
Message Communications ☐ ☐				
Computation (T/S) ☐ ☐				

*Cost includes salaries and equipment

2. Are you satisfied with the operation of your current systems? (Check above)

Comments:

_____

_____

_____

_____

3. Are you currently planning (or considering) changes in the way you handle your requirements for the above? (Record below)

	Y or N	Planned Solution
Data Processing		
Text (Word) Processing		
Copying		
Voice Communications		
Message Communications		
Competition		

3. (Contd)

Comments:

_____

_____

_____

_____

4. Explain technology and concept:

a) Small cheap computers (minis and micros)

b) Cheap electronic communications (satellite, packet)

c) Merging of computer and communications technologies

d) The possibility of multi-function equipment

e) Potential advantages (cost, space, one vendor)

For example, it is possible to start with any of the above office products or services and obtain additional functions and benefits. We would like your comments on six specific systems we will describe to you.

4. A. System #1 (Small Business Computer)

1. How important do you consider the following hardware features and derived functions:

Hardware Features	Very Important	Important	Not Important
Office Quality Printer			
Storage			
High Speed Printer			
Communications Control			
Additional Functions			
Text Editing			
Automatic Letter/Invoice			
Text Storage			
Message/Text EMS			
Sensor Control			
Communications (voice) Monitoring and Billing			
Communications (voice) Control			

2. Are there any other functions you would like to see in such a system?

3. Would you consider buying such a system?

Yes - For what purpose?

No - Why not?

4. Assuming better service and employee productivity, how much would you be willing to spend for such a system?

   At least as much as replaced costs _____

   Would require cost savings of _____ %

   Approximate: $ _____ per month
   (asked or estimated by interviewer)

5. Would you prefer to _____ purchase or _____ lease?

B. System #2 (Text Editing)

1. How important do you consider the following hardware features and derived functions:

Hardware Features	Very Important	Important	Not Important
Communications Control			
Arithmetic Unit			
Storage for Data			
Data Input/10 key pad			
Sensor Multiplexer			
Multi-Terminal DE			
High Speed Printer			
Additional Functions			
EDP Applications			
EDP Storage			
Terminal Function (Data)			
Terminal Function (Message)			
Electronic Mail			

2. Are there any other functions you would like to see in such a system?

3. Would you consider buying such a system?

Yes - For what purpose?

No - Why not?

4. Assuming better service and employee productivity, how much would you be willing to spend for such a system?

   At least as much as replaced costs _____

   Would require cost savings of _____ %

   Approximate: $ _____ per month
   (asked or estimated by interviewer)

5. Would you prefer to _____ purchase or _____ lease?

C. System #3 (Office Copier)

1. How important do you consider the following hardware features and derived functions:

Hardware Features	Very Important	Important	Not Important
Character Generator/ Laser Scanner			
Communications Controller			
Data Storage			
Additional Functions			
Facsimile Output			
Message/Terminal Output			
High Speed Printer			
Justification/Type Setting			

2. Are there any other functions you would like to see in such a system?

3. Would you consider buying such a system?

Yes - For what purpose?

No - Why not?

4. Assuming better service and employee productivity, how much would you be willing to spend for such a system?

   At least as much as replaced costs _____

   Would require cost savings of _____ %

   Approximate: $ _____ per month
   (asked or estimated by interviewer)

5. Would you prefer to _____ purchase or _____ lease?

D. System #4 (PABX)

1. How important do you consider the following hardware features and derived functions:

Hardware Features	Very Important	Important	Not Important
CRTs			
Keyboards			
Data/Text Storage			
Office Quality Printer			
High Speed Printer			
Additional Functions			
Small Business Computer			
Text Editor			
Data Terminals			

2. Are there any other functions you would like to see in such a system?

3. Would you consider buying such a system?

Yes - For what purpose?

No - Why not?

4. Assuming better service and employee productivity, how much would you be willing to spend for such a system?

   At least as much as replaced costs _____

   Would require cost savings of _____ %

   Approximate : $ _____ per month
   (asked or estimated by interviewer)

5. Would you prefer to _____ purchase or _____ lease?

E. System #5 (Communications Service)

1. How important do you consider the following hardware features and derived functions:

Hardware Features	Very Important	Important	Not Important
Installed Terminals			
Additional Functions			
Remote Text Editing			
Timesharing Data Analysis			
Proprietary Data Bases			

2. Are there any other functions you would like to see in such a system?

3. Would you consider buying such a system?

Yes - For what purpose?

No - Why not?

4. Assuming better service and employee productivity, how much would you be willing to spend for such a system?

   At least as much as replaced costs _____

   Would require cost savings of _____ %

   Approximate: $ _____ per month
   (asked or estimated by interviewer)

5. Would you prefer to _____ purchase or _____ lease?

4. F. System #6 (Computer Service Companies)

1. How important do you consider the following hardware features and derived functions:

Hardware Features	Very Important	Important	Not Important
Installed Terminals			
Additional Functions			
Electronic Mail			
Message Service			
Packet Switching			

2. Are there any other functions you would like to see in such a system?

3. Would you consider buying such a system?

Yes - For what purpose?

No - Why not?

4. Assuming better service and employee productivity, how much would you be willing to spend for such a system?

   At least as much as replaced costs _____

   Would require cost savings of _____ %

   Approximate: $ _____ per month
   (asked or estimated by interviewer)

5. Would you prefer to _____ purchase or _____ lease?

5. A. Who in your firm would be involved in the purchase of such equipment and/or services?

	Don't Have	Not Involved	Involved	Final Decision
EDP Head				
Office Manager				
Communications Head				
Controller				
Top Management				

B. 1) How complex (or difficult) a sale would it be?

2) Who should be contacted first (individual or organization)?

3) What would be the best strategy?

6. Since the systems are modular in nature, they can be initiated and built in numerous ways.

Rank your preference for the primary building block (1-6), and the most important derived function.

	Rank		Rank
SBC/T		Text Editor	
		EMS	
Text		SBC/T	
		Data Term	
Copier		Facsimile	
		Data or Text Output	
		EMS	
PABX		Text Editor	
		SBC/T	
Communications		EDP Services	
		Text Editor	
Computer Services		Text Editor	
		EMS	

CATALOG NO. S M F E

7. A. Rate the claimed advantages of MFE.
(1 = Very important, 2 = important, 3 = not important)

	Rating	Ranking of 1s (or most important)
Total cost lower		
Less space		
Single vendor		
Few operations		
More capabilities for each function		
Better responsiveness		
More storage can be justified		

Comments:

_____

_____

7. B. There are some possible disadvantages of MFE. How important are they? (same ratings)

	Rating	Are Any Critical for you?
Equipment failure (no backup)		
Only one function handled well		
Complexities		
Initial expense		
Cannot perform all functions		

CATALOG NO. [S][M][F][E][ ][ ][ ]

8. A. How would you categorize your overall reaction to MFE?

Enthusiastic! _____

Interested. _____

Confused *%/ _____

Doubtful _____

Who needs it? _____

B. Any other general comments?

CATALOG NO. S M F E

USER QUESTIONNAIRE (PHONE)

1. How do you currently handle your requirements for the following? And how much does it cost? Are you satisfied with the product or service? (Check appropriate box).

	In-house (Type)	Service Bureau (Which)	Manual (People)	Cost* ($ Per Mo.)
Satisfied ☐ Dissatisfied ☐ Data Processing				
Text (Word) Processing ☐ ☐				
Copying ☐ ☐				
Voice Communications ☐ ☐				
Message Communications ☐ ☐				
Computation (T/S) ☐ ☐				

*Cost includes salaries and equipment

2. Are you currently planning (or considering) changes in the way you handle your requirements for the above? (Record below)

	Y or N	Planned Solution & Reason
Data Processing		
Text (Word) Processing		
Copying		
Voice Communications		
Message Communications		
Competition		

3. Explain technology and concept:

a) Small cheap computers (minis and micros)

b) Cheap electronic communications (satellite, packet)

c) Merging of computer and communications technologies

d) The possibility of multi-function equipment

e) Potential advantages (cost, space, one vendor)

4. For example, it is possible to start with any of the above office products or services and obtain additional functions and benefits. We would like to know which of the following possibilities would be of interest to you. (Explain each primary system and added functions).

Primary System	Very Interested	Interested	Not Interested
SBC + Text processing, "electronic mail", & voice communications control			
Text processor + Data Processing, Data Entry & "Electronic Mail"			
Office Copier + Communications (Facsimile), Data & Text Output, & "electronic mail"			
PABX + Text Editing, Data Processing & Data Entry			
Common Carrier + Data Processing, Text Editing & Proprietary Data Bases			
Computer Services + EMS, Text Editing, "pocket switching"			

5. Which two of the possible systems are of most value to you?

Why?

Fill out detail on the two selected.

6. A. System #1 (Small Business Computer)

1. How important do you consider the following hardware features and derived functions:

Hardware Features	Very Important	Important	Not Important
Office Quality Printer			
Storage			
High Speed Printer			
Communications Control			
Additional Functions			
Text Editing			
Automatic Letter/Invoice			
Text Storage			
Message/Text EMS			
Sensor Control			
Communications (voice) Monitoring and Billing			
Communications (voice) Control			

2. Are there any other functions you would like to see in such a system?

3. Would you consider buying such a system?

Yes - For what purpose?

No - Why not?

4. Assuming better service and employee productivity, how much would you be willing to spend for such a system?

   At least as much as replaced costs _____

   Would require cost savings of _____ %

   Approximate: $ _____ per month
   (asked or estimated by interviewer)

5. Would you prefer to _____ purchase or _____ lease?

6. B. System #2 (Text Editing)

1. How important do you consider the following hardware features and derived functions:

Hardware Features	Very Important	Important	Not Important
Communications Control			
Arithmetic Unit			
Storage for Data			
Data Input/10 key pad			
Sensor Multiplexer			
Multi-Terminal DE			
High Speed Printer			
Additional Functions			
EDP Applications			
EDP Storage			
Terminal Function (Data)			
Terminal Function (Message)			
Electronic Mail			

2. Are there any other functions you would like to see in such a system?

3. Would you consider buying such a system?

Yes - For what purpose?

No - Why not?

4. Assuming better service and employee productivity, how much would you be willing to spend for such a system?

   At least as much as replaced costs _____

   Would require cost savings of _____ %

   Approximate: $ _____ per month
   (asked or estimated by interviewer)

5. Would you prefer to _____ purchase or _____ lease?

6. C. System #3 (Office Copier)

1. How important do you consider the following hardware features and derived functions:

Hardware Features	Very Important	Important	Not Important
Character Generator/ Laser Scanner			
Communications Controller			
Data Storage			
Additional Functions			
Facsimile Output			
Message/Terminal Output			
High Speed Printer			
Justification/Type Setting			

2. Are there any other functions you would like to see in such a system?

3. Would you consider buying such a system?

Yes - For what purpose?

No - Why not?

4. Assuming better service and employee productivity, how much would you be willing to spend for such a system?

   At least as much as replaced costs _____

   Would require cost savings of _____ %

   Approximate: $ _____ per month
   (asked or estimated by interviewer)

5. Would you prefer to _____ purchase or _____ lease?

6. D. System #4 (PABX)

1. How important do you consider the following hardware features and derived functions:

Hardware Features	Very Important	Important	Not Important
CRTs			
Keyboards			
Data/Text Storage			
Office Quality Printer			
High Speed Printer			
Additional Functions			
Small Business Computer			
Text Editor			
Data Terminals			

2. Are there any other functions you would like to see in such a system?

3. Would you consider buying such a system?

Yes - For what purpose?

No - Why not?

4. Assuming better service and employee productivity, how much would you be willing to spend for such a system?

   At least as much as replaced costs _____

   Would require cost savings of _____ %

   Approximate : $ _____ per month
   (asked or estimated by interviewer)

5. Would you prefer to _____ purchase or _____ lease?

6. E. System #5 (Communications Service)

1. How important do you consider the following hardware features and derived functions:

Hardware Features	Very Important	Important	Not Important
Installed Terminals			
Additional Functions			
Remote Text Editing			
Timesharing Data Analysis			
Proprietary Data Bases			

2. Are there any other functions you would like to see in such a system?

3. Would you consider buying such a system?

Yes - For what purpose?

No - Why not?

4. Assuming better service and employee productivity, how much would you be willing to spend for such a system?

   At least as much as replaced costs _____

   Would require cost savings of _____ %

   Approximate: $ _____ per month
   (asked or estimated by interviewer)

5. Would you prefer to _____ purchase or _____ lease?

6. F. System #6 (Computer Service Companies)

1. How important do you consider the following hardware features and derived functions:

Hardware Features	Very Important	Important	Not Important
Installed Terminals			
Additional Functions			
Electronic Mail			
Message Service			
Packet Switching			

2. Are there any other functions you would like to see in such a system?

3. Would you consider buying such a system?

Yes - For what purpose?

No - Why not?

4. Assuming better service and employee productivity, how much would you be willing to spend for such a system?

   At least as much as replaced costs _____

   Would require cost savings of _____ %

   Approximate: $ _____ per month
   (asked or estimated by interviewer)

5. Would you prefer to _____ purchase or _____ lease?

7. A. Who in your firm would be involved in the purchase of such equipment and/or services?

	Don't Have	Not Involved	Involved	Final Decision
EDP Head				
Office Manager				
Communications Head				
Controller				
Top Management				

B. 1) How complex (or difficult) a sale would it be?

2) Who should be contacted first (individual or organization)?

3) What would be the best strategy?

8. A. Rate the claimed advantages of MFE.
(1 = Very important, 2 = important, 3 = not important)

	Rating	Ranking of 1s (or most important)
Total cost lower		
Less space		
Single vendor		
Few operations		
More capabilities for each function		
Better responsiveness		
More storage can be justified		

Comments:

_____

_____

8. B. There are some possible disadvantages of MFE. How important are they? (same ratings)

	Rating	Are Any Critical for you?
Equipment failure (no backup)		
Only one function handled well		
Complexities		
Initial expense		
Cannot perform all functions		

9. A. How would you categorize your overall reaction to MFE?

Enthusiastic! _____

Interested. _____

Confused *%/ _____

Doubtful _____

Who needs it? _____

B. Any other general comments?

CATALOG NO. SMFE

INTERVIEW GUIDE MFE (VENDORS)

1. It appears that computer vendors, word processing vendors, office copiers, communications carriers and equipment vendors, and computer service companies are all becoming increasingly competitive. (Give examples.)

   a. Do you think this is really a major trend?

   b. Where is the most serious confrontation going to occur?

   c. Can any class of vendors be excluded as being serious competitors in other markets?

2. a. Do you feel users really want MFE?

   b. What are its main benefits to users?

   c. What types of organizations (size and industry) are especially attracted to MFE?

3. a. From a vendor's point-of-view, what are the advantages of MFE?

b. What are the disadvantages?

4. What is your opinion of the viability of the following specific systems?

	Reasonable Approach (Technically)	Probability of Success and When (Marketing)	Which Industries	Which Vendors
System #1				
System #2				
System #3				
System #4				
System #5				
System #6				

5. What is your opinion of multifunction equipment?

a. Technically (Hardware)

b. Software Systems

c. Applications Support

d. Maintenance Complexities (Hardware and Software)

e. Marketing Complexity

6. What are the key functions and support requirements for:

a. System #1

b. System #2

c. System #3

d. System #4

e. System #5

f. System #6

7. a. What do you see as the primary vendor strategies?

b. Why are these strategies developing?

c. What do you think of these strategies?

d. What will probably happen?

8. What are you going to do?